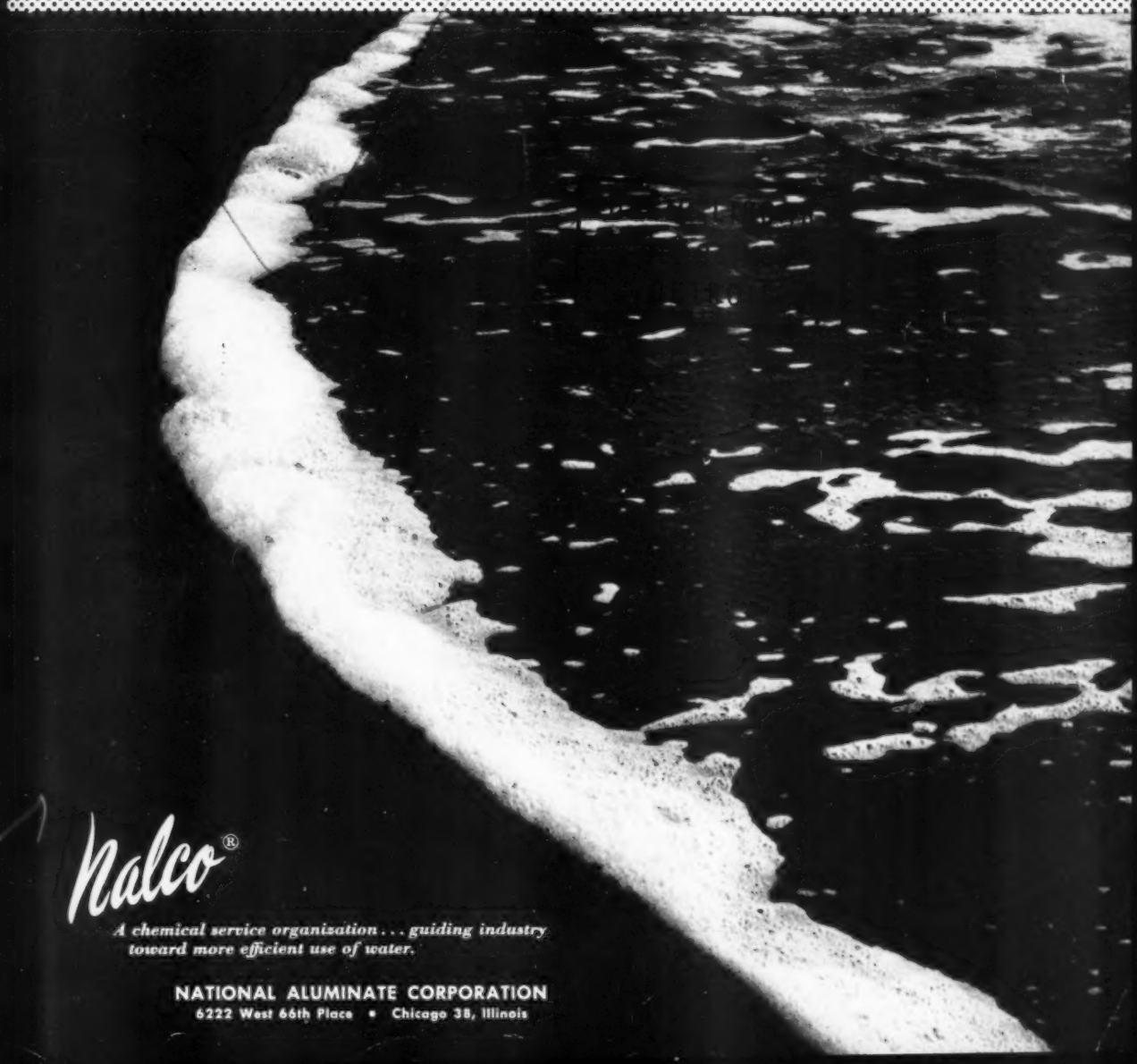
HNOLOGY DEPT.

SEPTEMBER 1953

Paper Industry



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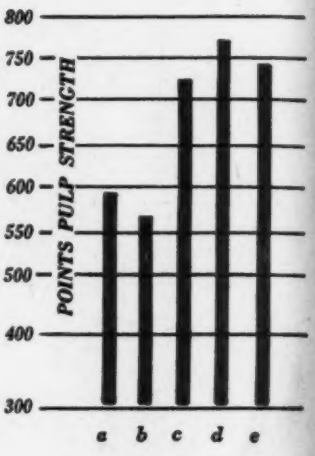
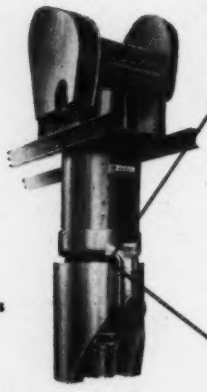
What happens to SCREEN REJECTS in your mill ?

PULP CONTAINING 5% REFINED REJECTS SHOWS 7½% MORE STRENGTH THAN NORMAL HIGH YIELD KRAFT—WITH HIGH QUALITY APPEARANCE RETAINED





medium size
J-C Zenith Press

a. 100% rejects — one pass in high density refiner

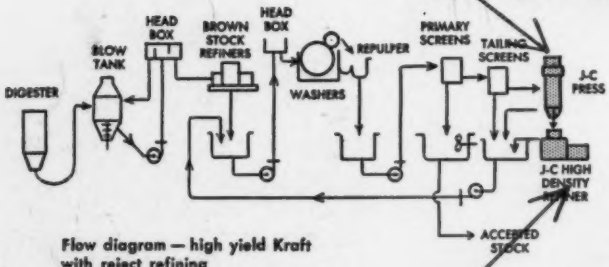
b. 100% rejects — two passes in high density refiner

c. Normal high yield Kraft pulp

d. 95% C & 5% A

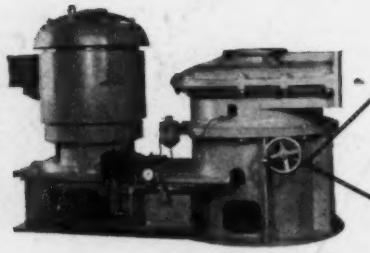
e. 95% C & 5% B

Points pulp strength = 2 × Mullen plus tear. (Note that pulp containing refined rejects is stronger than normal pulp and equal in appearance.)



Flow diagram — high yield Kraft with reject refining

RECENT TESTS PROVE A SUPERIOR PULP RESULTS FROM MIXING A PULP NOW LOST (REJECTS) WITH NORMAL HIGH YIELD KRAFT



J-C 015 Refiner

You can have similar savings with the simple installation of a J-C PULP PRESS and 015 HIGH DENSITY REFINER in your present system. Here's how the J-C system makes possible these remarkable savings . . .

After leaving the tailing screens the rejects are pressed to high consistency, processed in the specially designed 015 refiner and returned to the blow tank. A wide separation between the plates allows the 015 refiner to operate at high density with less power per ton of pulp. A striking feature of the 015 refiner is its inherent ability to produce long fibers, resulting in better tear.

THESE PLUS FEATURES OF THE J-C PRESS AND REFINER SYSTEM ADD UP TO EXTRA SAVINGS:

- By eliminating rejects, digester capacity is improved; cost of chemicals per ton is reduced.
- Reduces amount of dilution in black liquor.
- Output of mill is increased by amount of rejects (5%).

Our engineers and facilities are at your service. For information, write Dept. P.

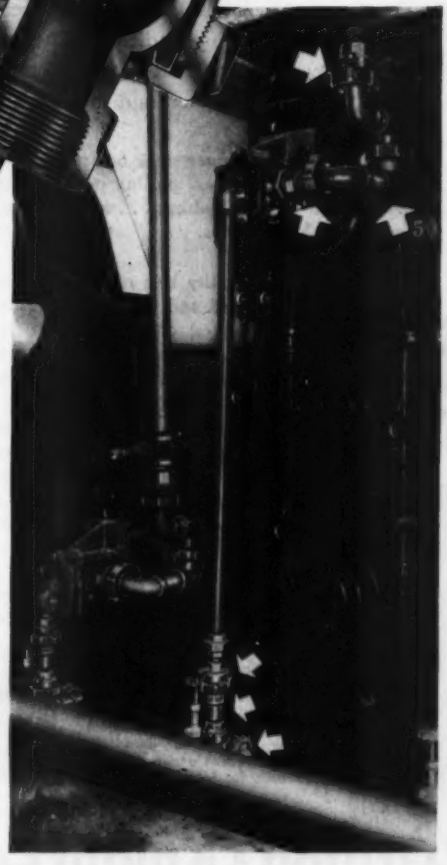
J-C **JACKSON & CHURCH CO.** SAGINAW, MICHIGAN

Work well done since eighty-one

NOW! A Better Piping Hook-Up for Paper Machines

BARCO *Flexible* **BALL JOINTS**

"MOVES IN ANY DIRECTION"



THESE pictures show how a number of paper mills and leading machine builders are now using Barco Ball Joints to make trouble-free *flexible* piping connections to dryers.

OVERCOMES "CONNECTOR FAILURES"—Failures experienced in other flexible connectors have been traced to a characteristic *"double twisting"* action set up by expansion and contraction in long steam supply and condensate return headers.

ACCOMMODATES ALL MOVEMENT—Barco Ball Joints readily accommodate movement in any direction, *including swivel action.* Used in combination with standard iron pipe, they provide leakproof flexible connections for steam and condensate lines that are practically indestructible.

AVAILABLE NOW—Barco engineers and representatives are ready with recommendations for hook-ups and joints to meet your particular needs. *Call or write today!*

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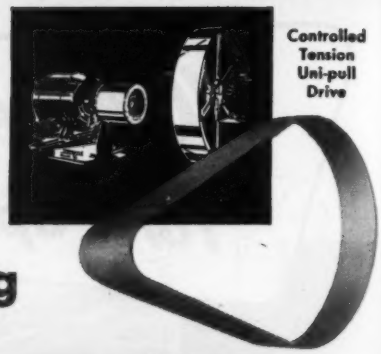
Whatever your drive . . .

You'll transmit maximum power *longer* with G&K Flat Leather Belting



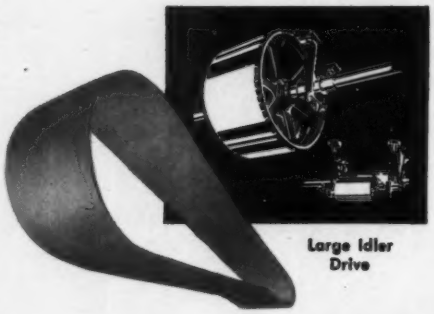
Controlled Tension Uni-pull Drive

Your own tests will prove that Graton & Knight flat leather belts deliver more horsepower over longer periods of time than ordinary transmission belting.

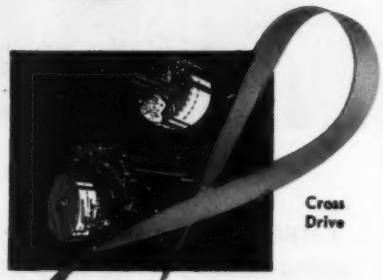
That's because three qualities are developed in every G&K belt through the expert selection, currying and tannage of top grade leather.

First there's tight pulley wrap for maximum horsepower and sustained rpm. Next, there's fluid drive action to absorb starting torque and load shock. And finally, you get a natural "three-dimensional" fiber leather belt which is built to last for many years of profitable service.

There's a G&K flat leather belt engineered for your specific drive and operating conditions. The three most popular brands (shown below) are all tension-cemented by a patented process, waterproof-treated and mildew-proofed.



Large Idler Drive



Cross Drive

HEART OAK — Top grade center stock oak tannage for lateral firmness and real pulling power. Famous general purpose belting . . . ideal for heavy duty, stepcone and shifter drives.

PREMIUM RESEARCH QUALITY — Premium quality belt of choicest center stock leather tanned and curried by exclusive G&K process. Highest coefficient of friction, great flexibility and resilience with minimum permanent stretch. Ideal for short center, serpentine and other *precision* drives.

SPARTAN — Special combination tannage engineered for drives that must operate under severe atmospheric conditions. Very high friction surface with great flexibility and little shrinkage or expansion under varying degrees of humidity. Resists heat, steam, oil, acid and alkali fumes.

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Charts and formulas for the engineer — specification details for the buyer — application and operating data for the maintenance man. A copy is yours for the asking.

Serpentine Drive

GRAKO® Sprazon

THE ORIGINAL BELT DRESSING IN A SPRAY CONTAINER

Spray away belt slip and increase belt life with SPRAZON. It's safe. It's easy. It's economical. Use on leather, rubber, fabric — flat, round and V belts. Also available in cans and drums. See your distributor or write for folder.

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B-5

The Paper Industry

Technology • Engineering • Management • Production

VOLUME 35 • NUMBER 6 • SEPTEMBER, 1953

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Shown in the above view are two of the four digesters built by the Chicago Bridge & Iron Company for the St. Regis kraft mill at Eastport, Florida. Now in service, they will cook pulp for 100,000 tons of kraft paper and board by the end of the year. This new production boosts the total kraft paper and board output of the St. Regis Paper Company to approximately 560,000 tons per year and that's big business.

If you need new digesters to expand your present mill capacity or to replace old units, write our nearest office for an estimate or quotation.

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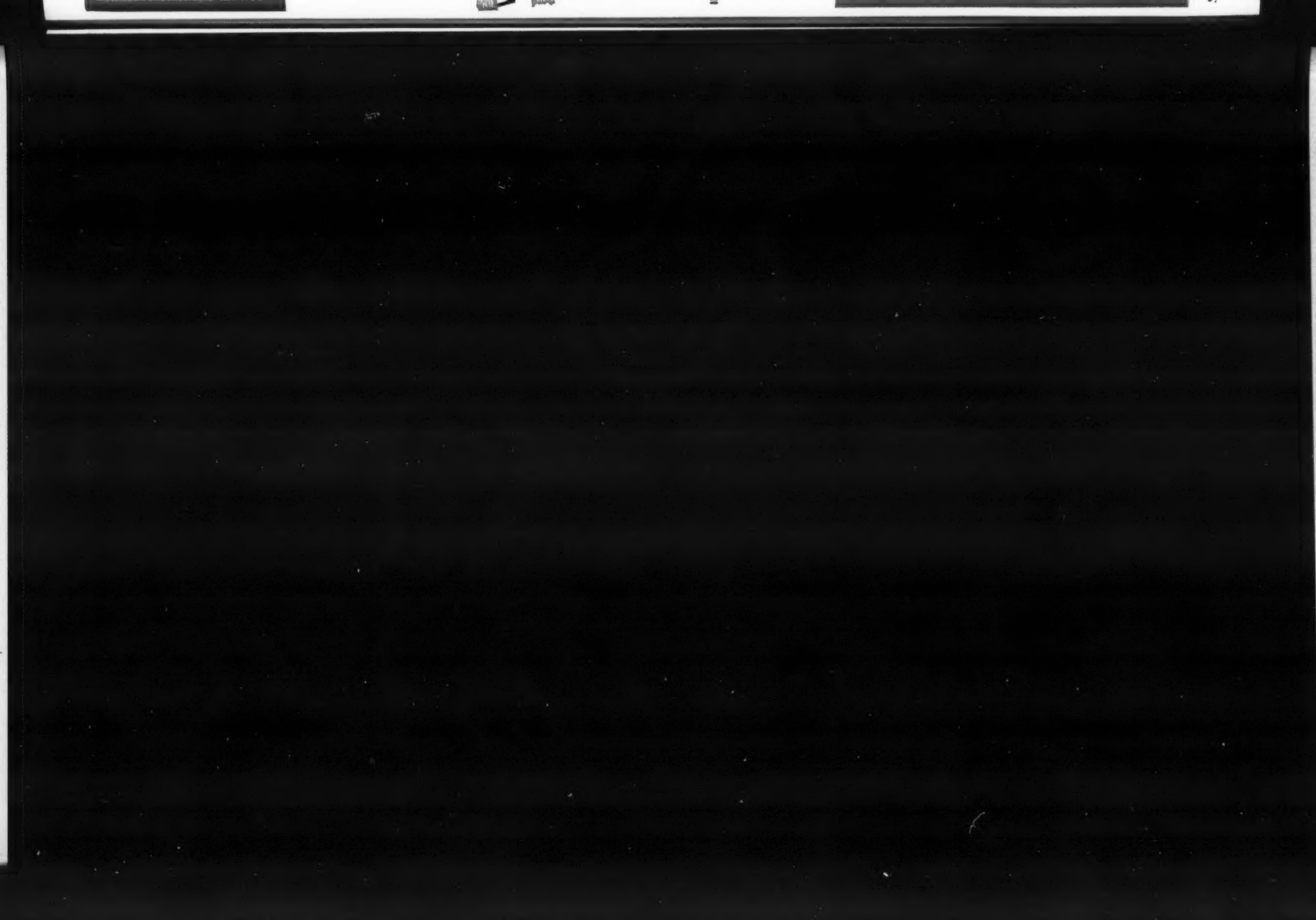

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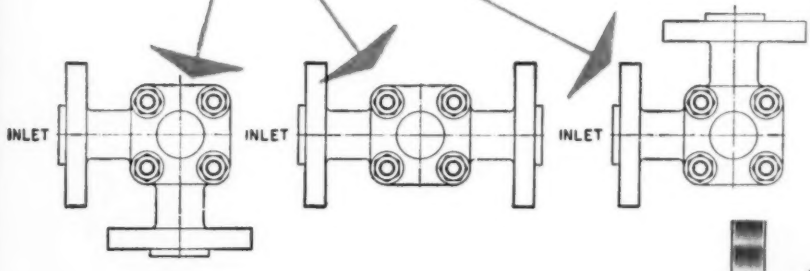

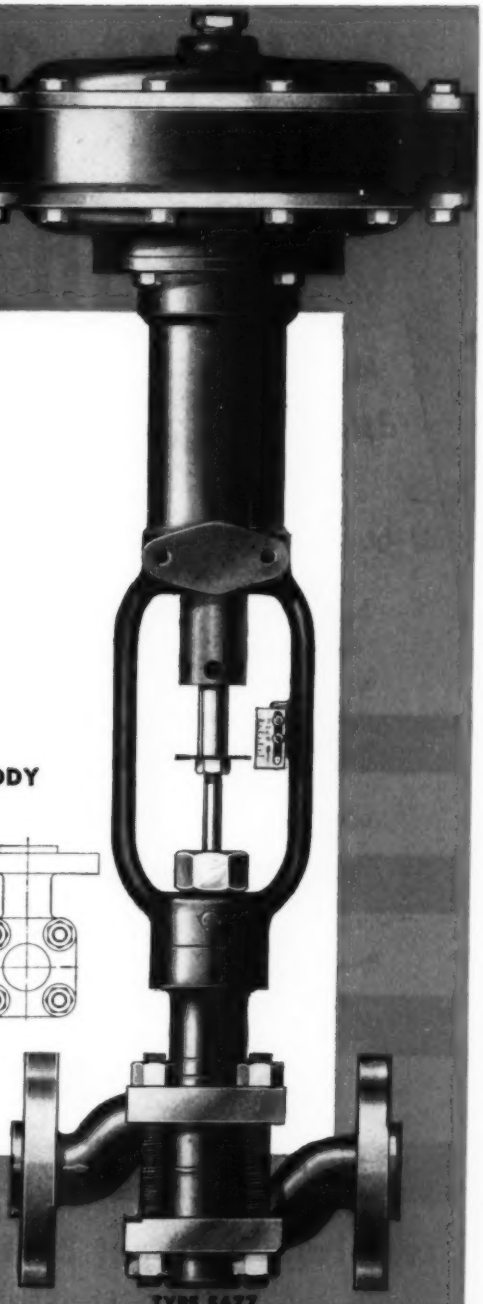

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- Available with a direct or reverse acting diaphragm motor.

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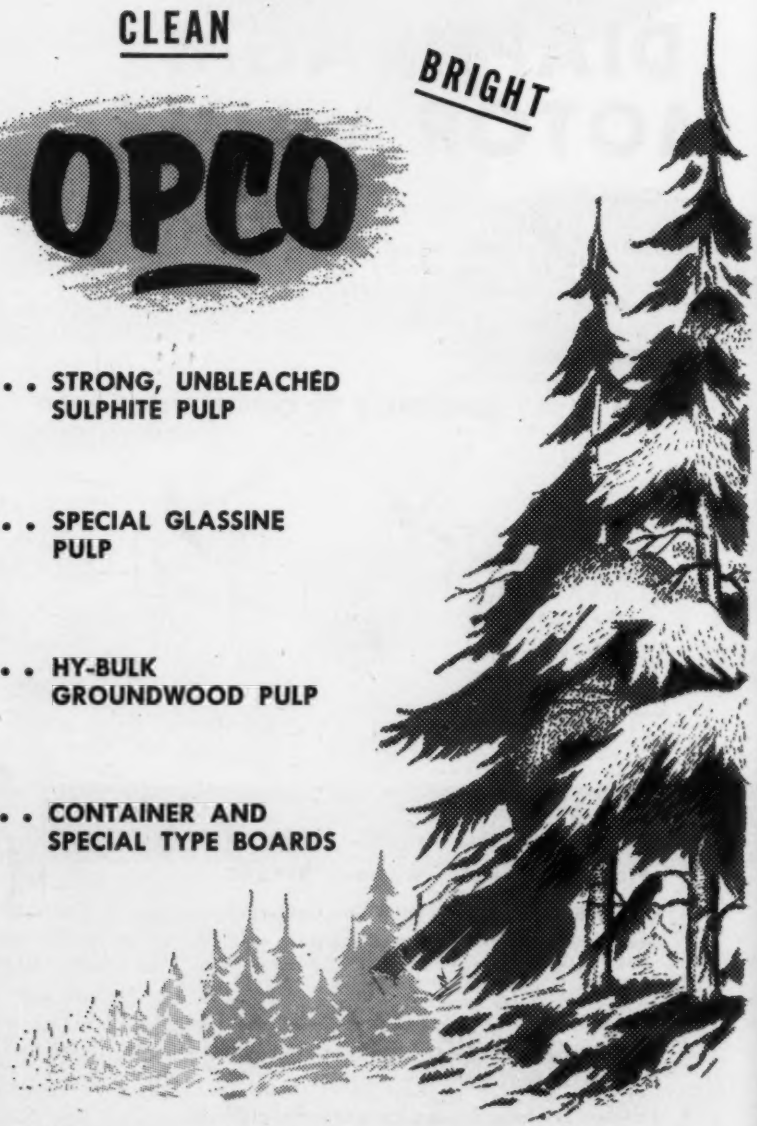

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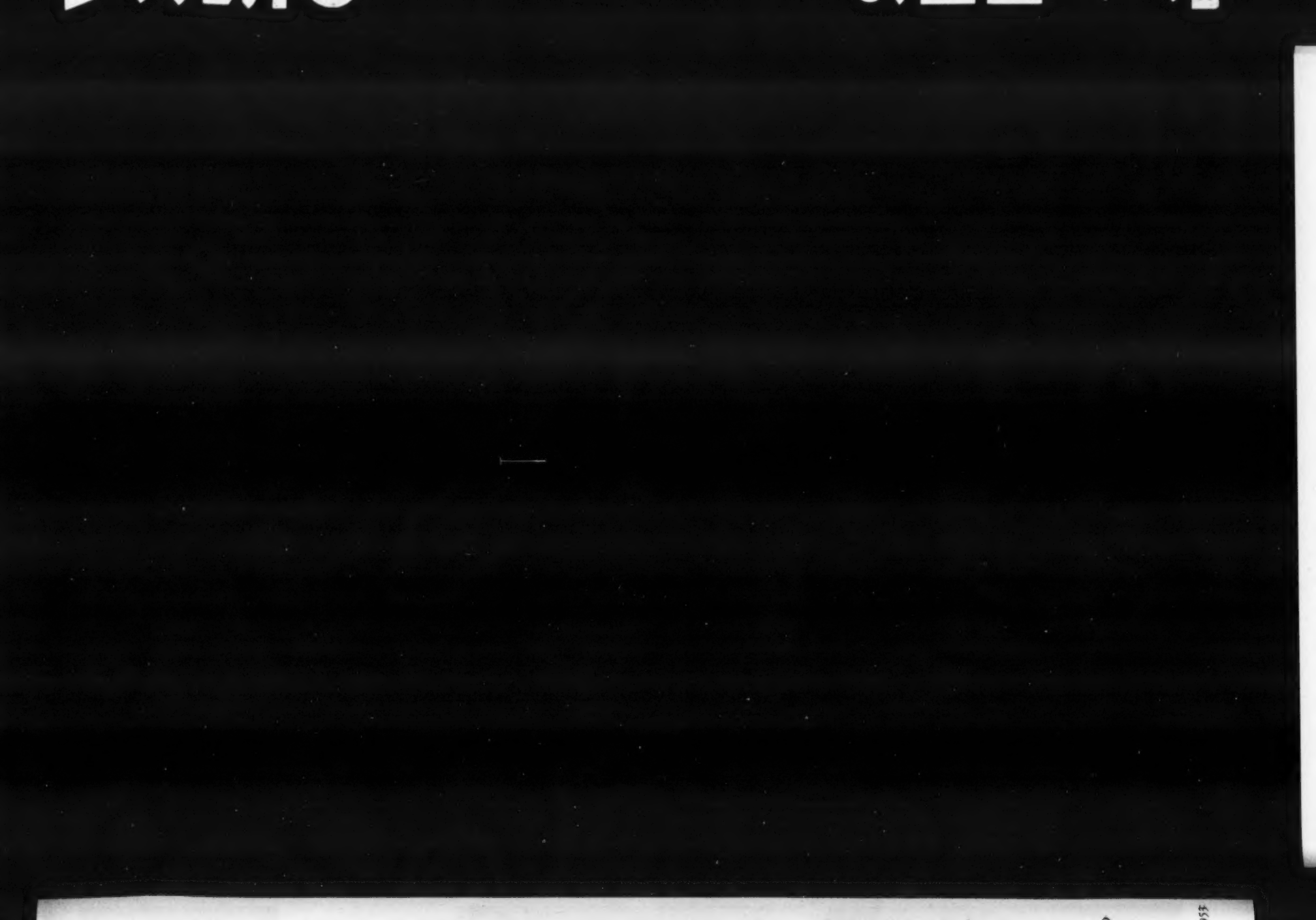

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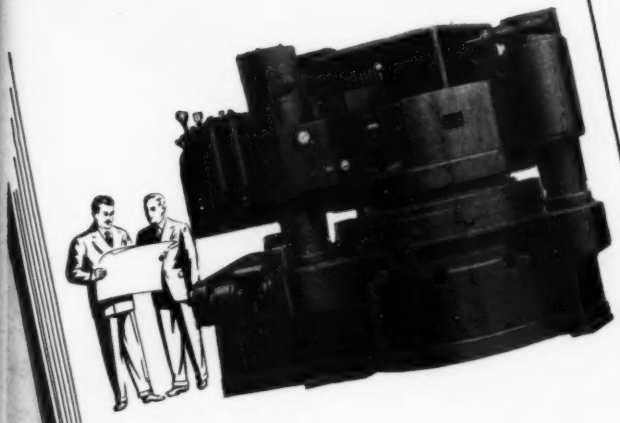

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If your mill hasn't investigated the Curlator . . . seen how Curlation saves pulp wood and improves paper quality . . . been shown how Curlators pay for themselves in less than a year, WRITE us at once and let us show you without obligation.

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HYDROSEAL will increase the Mullen, fold, tear, pick and tensile strength of your paper. It requires no preparation. It is a cold water swelling starch that is added directly to the beater in dry form.

HYDROSEAL improves formation and scuff resistance of the sheet, and improves greaseproofness of glassine. It cuts white water losses by increasing retention of fillers and fines, lays fuzz, and gives a better surface.

HYDROSEAL gives you better retention of starch in the sheet, too. And it's versatile — works in all types of paper from high grade bond and book papers to Kraft. For example, it improves the Mullen and formation of ledger paper and increases the flat crush of corrugating medium.

Fur further information about HYDROSEAL, or any one of National's complete line of starches and adhesives for the paper field, write —

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270 Madison Avenue
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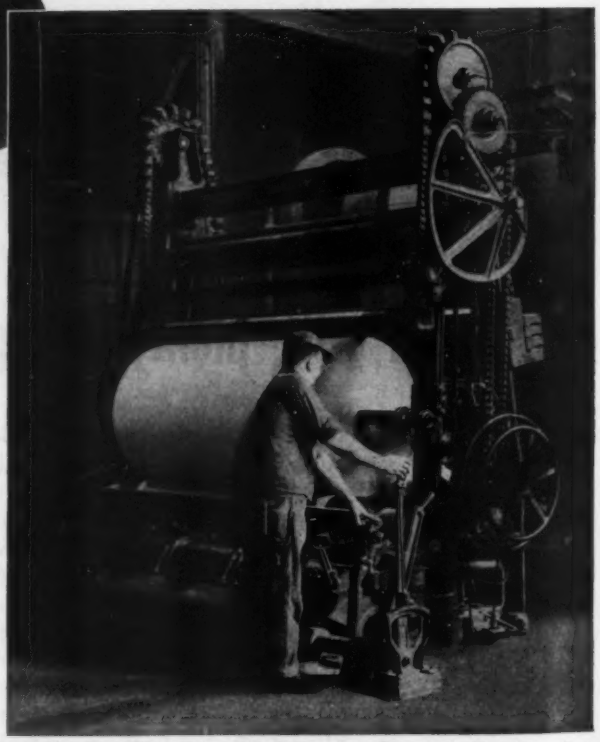
"Our Camachine 14 handles 70 tons of asbestos paper a day

—keeping well ahead of the paper machine output"

says R. D. DEININGER, plant manager
Sall Mountain Company, Hamilton, Ohio



Camachine Type 14 in action at Sall Mountain Company's Hamilton plant

"Our paper machine department faced a twofold problem . . . increased production and more exacting roll specifications. With equipment then operating, rejects through slipped or spliced rolls were alarming and maintenance was excessive.

"Cameron engineers provided a Type 14 equipped with shear-cut slitters to wind our 'Sal-Mo' asbestos paper (in a caliper range of .012 to .125) in rolls of varying width and diameter.

"Our Camachine 14 readily filled the bill and 'Sal-Mo' customers continued to receive the quality goods made popular by this famous name in the asbestos industry."

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For example, Camachine engineers have recently completed new parts catalogs covering most mill-type models. These carefully illustrated books provide fast, easy, accurate reference to any part of the machine. Write for information.

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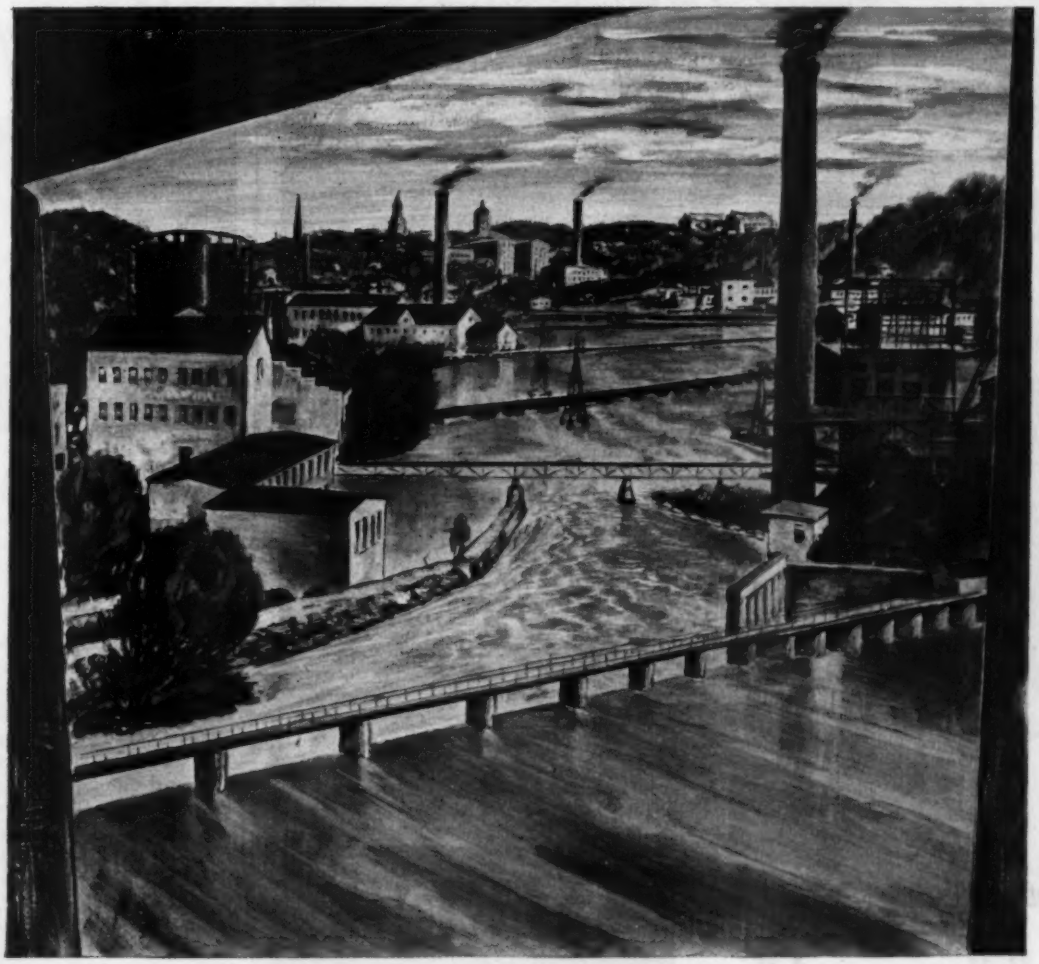
Don't wind up with less than a *Camachine*®

1A-278

APPLETON - - - - - - - another in a series of scenes... areas where Appleton Wires serve the paper industry.



HESITATE here for a moment on Memorial Drive Bridge and glance downstream. This is Appleton, Wisconsin...a busy town...a beautiful town ...a pleasant blending of culture and hospitality, higher education, industry, science and agriculture. We are proud of our home town.

Right here at home, in the heart of the Fox River Valley, you'll also find the paper industry. All of these neighborhood mills know, from long experience, that *Appleton Wires are Good Wires!*

APPLETON WIRE WORKS, INC., APPLETON, WISCONSIN

Despite cleanliness and efficiency of a midwest firm's Plastic Division, shown above, there was "dirty work" afoot in the hydraulic systems of the injection molding machines. Division superintendent (left) and A. L. Seabaugh, of Standard Oil, came up with a solution.

Stops "dirty work" in hydraulic units

● A midwest company became increasingly aware that hydraulic oil performance in its fourteen injection molding machines was not all that it should be. Formation of oil deposits not only made frequent cleaning of filters necessary but posed a threat to efficient operation of the hydraulic units.

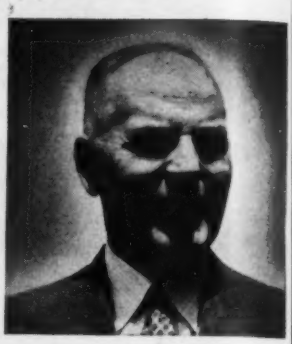
A Standard Oil lubrication specialist recommended STANOIL Industrial Oil, a top quality product of exceptionally high stability and containing necessary additives to prevent corrosion and oxidation troubles.

Throughout six years of continuous hard use, STANOIL has provided clean operation. It has not been necessary to replace any of the original fills of STANOIL, and only a small amount of make-up oil has been needed. Where filters previously had to be cleaned at least four times a year, they are now cleaned once each year. Hydraulic operation has been efficient and reliable.

STANOIL
TRADE MARK
Industrial Oil

You can rely on STANOIL to give you the same clean, dependable service not only in hydraulic units but in a wide variety of equipment. You can get the help of the Standard Oil lubrication specialist serving your section of the Midwest by phoning your local Standard Oil office. Or, write: Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Illinois.

What's YOUR problem?



A. L. Seabaugh, working out of Standard's Chicago office, is the lubrication specialist who helped this midwest firm gain both operating and maintenance benefits through use of STANOIL in hydraulic units.

Located throughout the Midwest is a corps of specially trained, experienced Standard Oil lubrication specialists, ready to give you prompt, on-the-spot help with lubrication in your plant. Their broad background of practical experience, plus their thorough training in Standard Oil Lubrication Engineering Schools, is yours for the asking. Simply phone your nearest Standard Oil Company office. The lubrication specialist will call without delay. He has a complete line of petroleum products to offer, including such outstanding lubricants as:

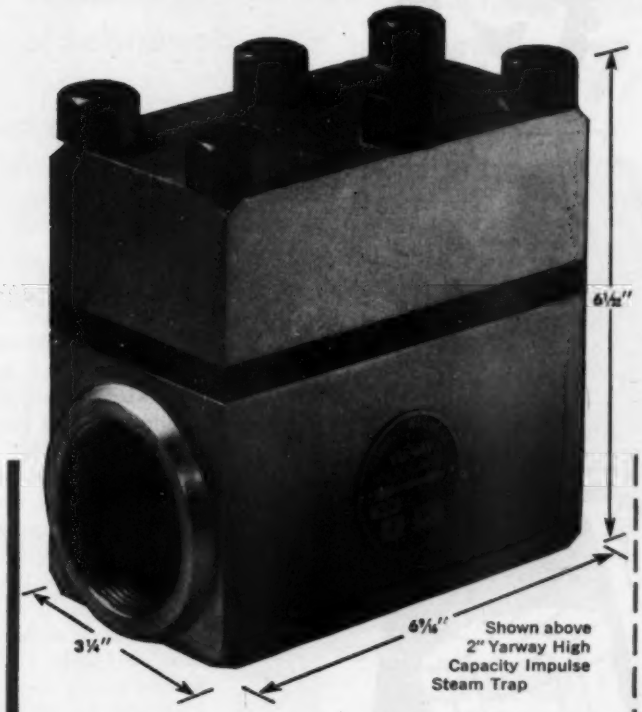
SUPERLA Greases — Available in a wide range of consistency grades and in both lime-soap and soda-soap types. SUPERLA Greases cover a wide range of operations. These efficient products are comparable in quality with the highest type of special greases.

STANOLITH Greases — Because these unique lithium soap products possess the heat resistant properties of soda-soap greases and the water resistant properties of lime-soap greases, they offer a solution to lubrication problems caused by the presence of both heat and water.

STANDARD OIL COMPANY

STANDARD (Indiana)

NEW HIGH CAPACITY
IMPULSE STEAM TRAP



Shown above 2" Yarway High Capacity Impulse Steam Trap

CAPACITIES OF YARWAY SERIES 50 TRAPS

Pressure PSIG	CAPACITY* pounds per hour		
	1½"	2"	2½"
1	3000	4670	9500
2	4500	7000	15000
3	6000	9350	19500
4	7000	10900	22400
5	7500	11700	24400
6	8000	12500	26000
7	8300	12900	27300
8	8600	13400	28400
9	8800	13700	29400
10	9000	14000	30250
15	9650	15050	32800
20	10300	16100	35000
40	12530	19600	43500
60	14400	22500	49600
80	16000	25000	55000
100	17300	27000	60000
125	18700	29200	65700
150	19900	31100	70300
200	21900	34200	77400
250**	23500	36200	81500
300**	24700	37400	84000

*Capacities are based on condensate 30° F. below steam temperature.

**When total equivalent length of piping connected to trap is greater than 20 feet, it is recommended that the capacity values indicated for 200 # pressure be used in figuring requirements for all pressures above 200 psi.

NEED to handle condensate in unusually large quantities?

Then here is your steam trap—the Yarway Series 50 Impulse—"big brother" to the well-known Series 60 and 120 Yarway Impulse Steam Traps of which over 900,000 have been sold. Uses the same basic operating principle.

The new Series 50 (made in three sizes, 1½", 2" and 2½"), has proved highly successful for condensate drainage on heat exchangers and stage heaters in power plants; reboilers, reheaters, stills, evaporators, debutanizers, etc., in refineries and chemical plants; large dryers in paper mills and textile plants, etc.

In many cases, Yarway Series 50 Traps have replaced traps several times their size.

For full information, write for Yarway Bulletin T-1745.

YARNALL-WARING COMPANY
149 Mermaid Avenue, Philadelphia 18, Pa.

YARWAY IMPULSE STEAM TRAP

OVER 900,000 STANDARD YARWAY IMPULSE STEAM TRAPS ALREADY SOLD

Series 60 and 120 Yarway Impulse Steam Traps in six sizes from ½" to 2" are used for all normal requirements. Stocked and sold by 250 local distributors. See Bulletin T-1740.

For strong, dependable closures—use strong, dependable ARMOUR glue!

Armour's CX Bone glue is the perfect "strong" glue for gummed paper tape, kraft sealing tape and gummed labels

Strength and dependability are the reasons for using gummed paper tape or kraft sealing tape. Why take chances on these vital properties by using anything but the finest domestic glues?

When you buy Armour CX Bone Glue, you *know* what you are getting—the finest low-priced glue for gummed tape. It's produced with all the skill and experience of our 68 years of making glue. You know it's uniform and dependable, unvarying in quality, with high viscosity and a pleasant odor. And you know that tape made with CX Bone Glue moistens readily and has a quick grab.

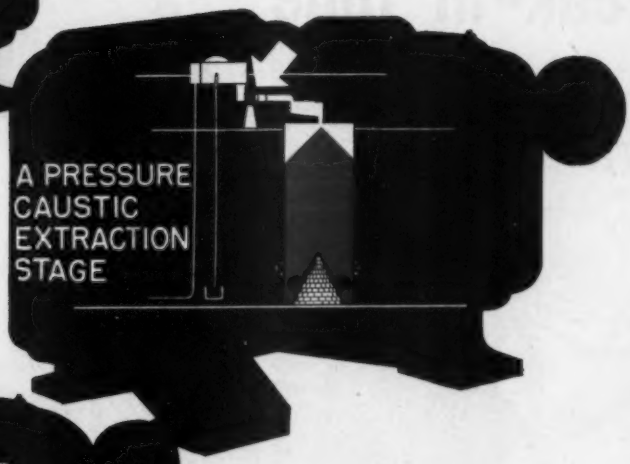
There's no point in taking chances on the quality of the glue used for any paper or converter process, because there's an Armour glue that fits each job. Our BC Hide Glue is an accepted standard for use in Sveen retention systems, and our lower test, low price CX is gaining in popularity for use in the same process. Our clear chrome hide glue is extensively used for surface or tub sizing of rag bond paper. We have glues for "on machine" creping directly from the Yankee Dryer that supply the tacking properties necessary for softness in paper tissues. There's a dependable Armour glue for any paper operation. Write Armour today for complete information, including prices.

ARMOUR *Adhesive Division*

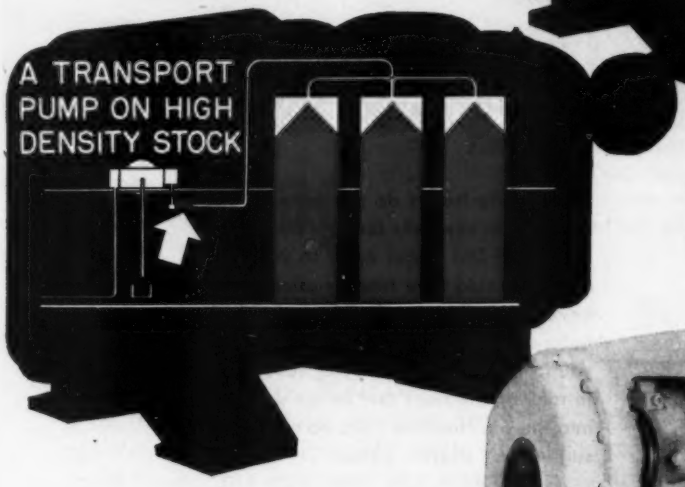
Armour and Company • 1355 W. 31st Street • Chicago 9, Ill.
Delaware and Spring Garden Streets • Philadelphia 23, Penn.
50 Farnsworth Street • Boston 10, Massachusetts
120 Broadway • New York 5, New York
2501 83rd Street • North Bergen, New Jersey
235 So. Hamilton Street • High Point, North Carolina

THICK STOCK PUMP

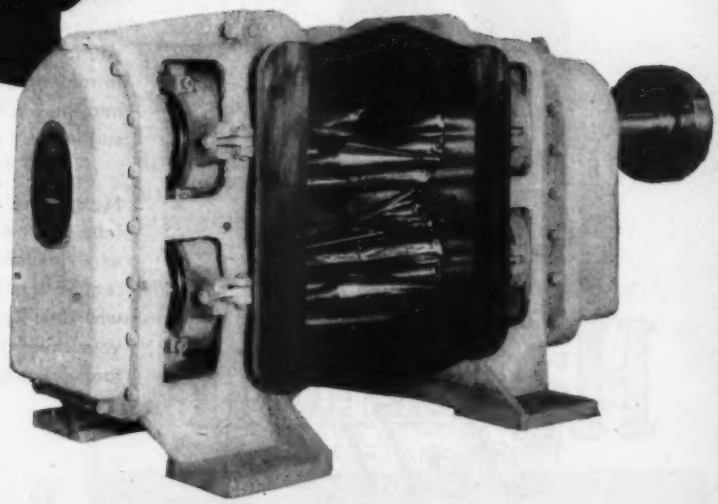
PUMPING 10%-17% PULP



IMPCO



SERIES - 300 *
SERIES - 500 *



This unit is a positive displacement type pump specifically designed to handle pulps at high densities. The conical profile of its synchronous rotors permits the pumping of stock at densities above 10% A.D.—with lowest horsepower per ton—and no fibre damage. Truly the modern way to handle all types of pulp.

***Tons per day**

IMPROVED MACHINERY INC.

J-35

NASHUA, NEW HAMPSHIRE

Sherbrooke Machineries Limited manufacture similar equipment in Canada

HAM FELTZ says:

"Save the break-in time"

How many hours do you spend breaking in new felts for your board machines? Did it ever occur to you that you could save time by using felts that have been broken in and pre-shrunk before you use them? No necessity for you to keep adjusting stretch rolls to take up the slack that hangs down into the pit. Hamilton Felts do not sag—don't stretch, either.

Next time you are in the market for felts ask the Hamilton Sales Engineer why Hamilton Felts remove water faster, require less time for adjustment—why Hamiltons put finer finish on your sheet and why they last so much *longer* without getting *shorter*.

Hamilton Felts

SHULER & BENNINGHOFEN, HAMILTON, OHIO

Puttin' the Profits in Long-Haul Logging

PILIN' PULPWOOD PROFITS HIGH is a continuous process because the International T-6 crawler will have another 20,000 pounds of pulpwood waiting at the landing place when the truck returns empty.

T-6 Keeps Big Truck Busy

Down Georgia way, M.V. Blount tackled a pulpwood operation 10 miles from the nearest railroad siding. The only way he could make this long haul pay was to use a big International truck that carried 4½ units of pulpwood per load . . . and a rough and ready International T-6 crawler tractor to keep a steady supply of pulpwood comin' out of the woods fast enough to keep the truck busy.

The handy T-6, like other gasoline and diesel-powered IH crawlers, pays off in the woods because it has the speed and power and stamina to do more work per day, every day—through winter mud or summer dust—wherever your jobs may take you.

Let your International Industrial Distributor give you the inside story on the whole International line of rugged red crawlers. Put International "Power that Pays" to work for you!

INTERNATIONAL HARVESTER COMPANY
CHICAGO 1, ILLINOIS

POWER THAT PAYS

INTERNATIONAL HARVESTER

INTERNATIONAL

LODDING

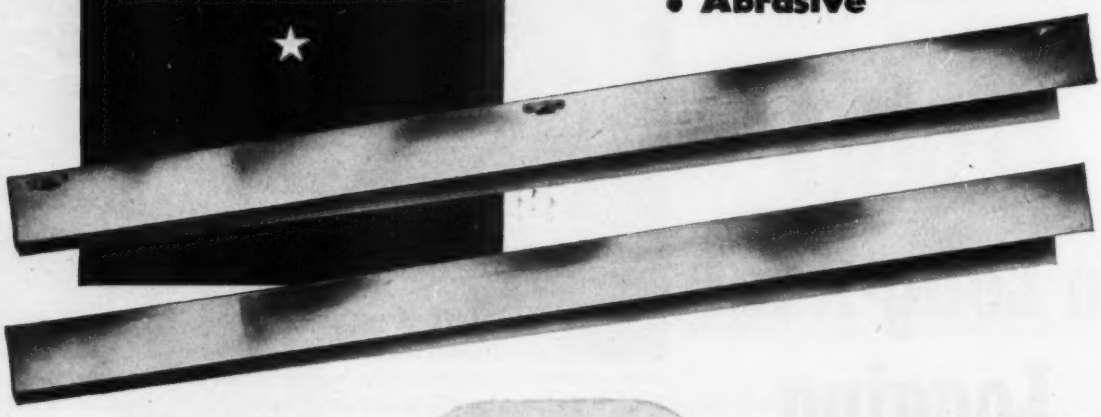
Precision Built

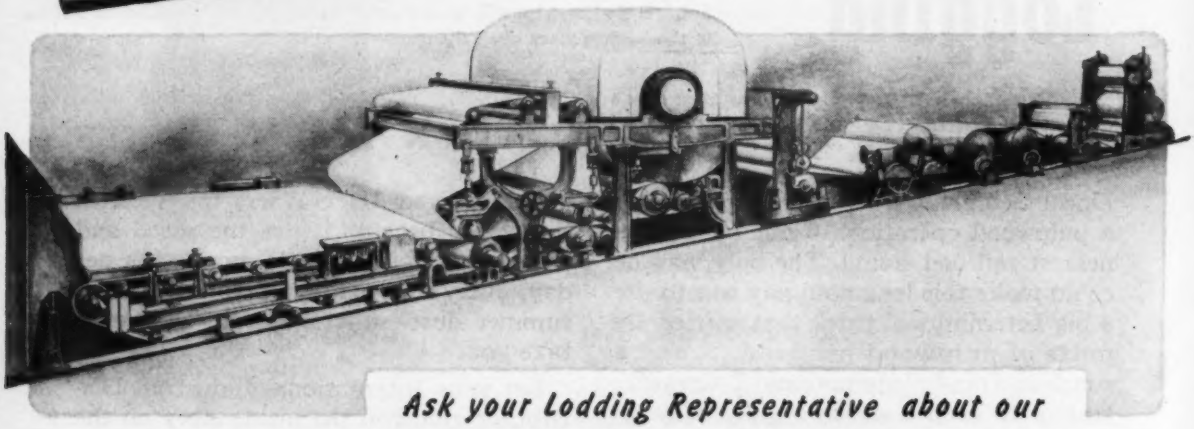
DOCTOR BLADES

★ ★ ★ ★ ★ ★ ★

Available in:

- **K Monel**
- **Alloy Steels**
- **Stainless Steel**
- **Phosphor Bronze**
- **Laminated Plastics**
- **Abrasive**





Ask your Lodding Representative about our blade survey service

LODDING ENGINEERING CORPORATION

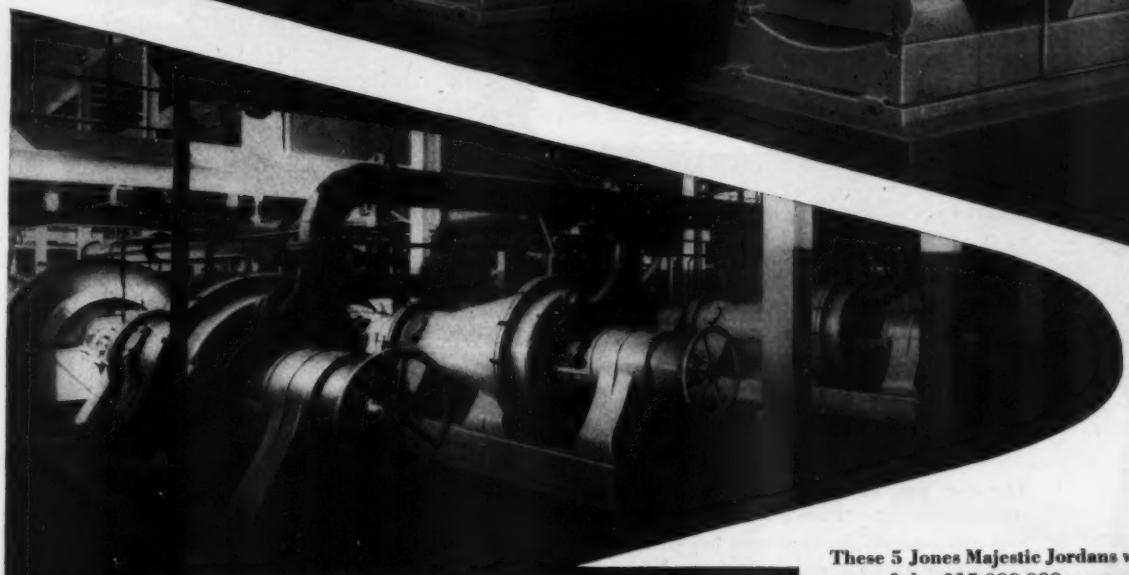
WORCESTER, MASSACHUSETTS

REPRESENTED BY

W. E. GREENE CORPORATION • WOOLWORTH BLDG., NEW YORK

ANOTHER E.D. Jones INSTALLATION

A new worm adjusting mechanism is featured in these 4 Jones Majestic Jordans at Weyerhauser's new board mill at Longview, Wash.



ANOTHER E.D. Jones INSTALLATION

These 5 Jones Majestic Jordans were part of the $15,000,000 expansion program at Hollingsworth & Whitney's Mobile, Ala., plant.

Majestic is the word for these Jordans

The Majestic is only one of the many sizes in which Jones Jordans are made. But such is the popularity of this high-capacity work horse that it accounts for 25% of the Jones Jordans sold to date. Like all Jones Jordans it incorporates exclusive features developed from our more-than-a-century of service to paper mills. For more details, ask your Jones representative or write for Bulletin 1007-A.

E.D. Jones

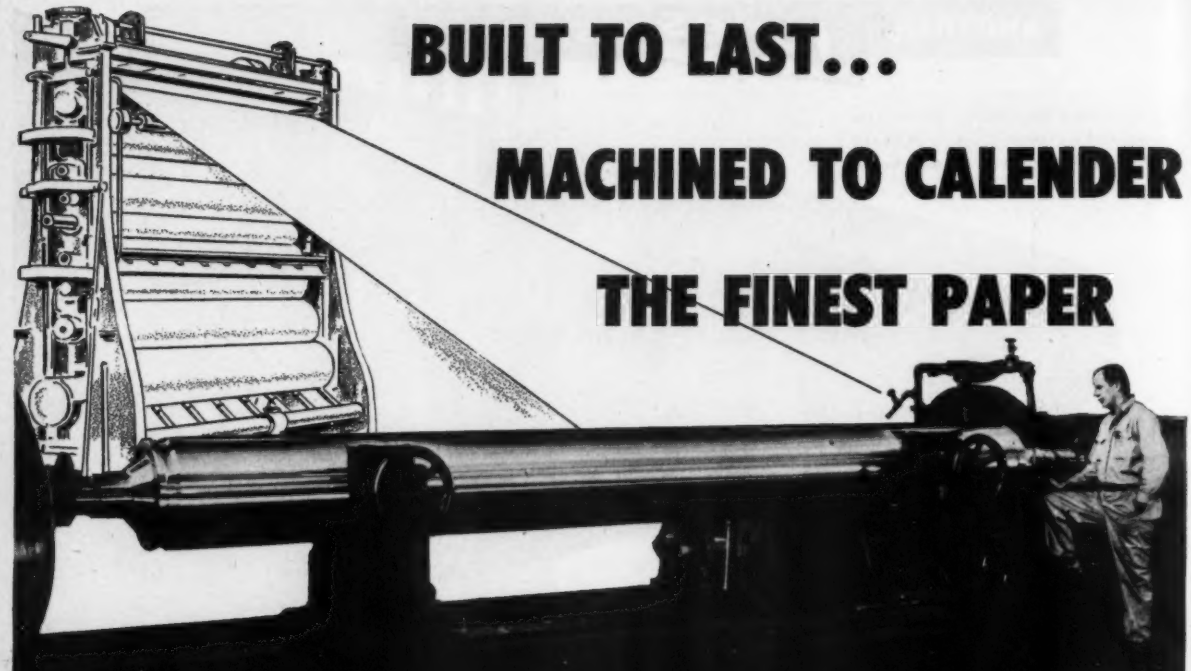
E. D. Jones & Sons Company, Pittsfield, Mass.

BUILDERS OF QUALITY STOCK PREPARATION MACHINERY

BUILT TO LAST...

MACHINED TO CALENDER

THE FINEST PAPER



MIDVALE STAINLESS STEEL ROLLS
MADE TO WITHSTAND PITTING AND CORROSION

The fine precision forged stainless steel rolls produced by Midvale craftsmen have won a reputation for their long life in the paper industry. In some installations where regular rolls in the water box position pitted and corroded badly . . . Midvale stainless steel rolls are still running without regrinding.

Every day the reliability of Midvale stainless steel rolls is being proved in America's leading paper mills. The skill and experience of Midvale craftsmen assure rolls built to the most exacting specifications of hardness and finish. Modern equipment and quality control—from furnace to finished roll—produce rolls unsurpassed in performance.

Whatever your needs in rolls—either stainless or alloy for fine paper, corrugated or other material—Midvale can make the rolls you need for longer life and better finish.

Midvale produces all types of heavy equipment to meet the specifications of the paper industry—forgings, heat and corrosion resistant castings and pressure vessels.

THE MIDVALE COMPANY
NICETOWN, PHILADELPHIA 40, PA.
OFFICES: NEW YORK • CHICAGO • PITTSBURGH
WASHINGTON • CLEVELAND • SAN FRANCISCO

MIDVALE

Custom Steel Makers to Industry

PRODUCERS OF FORGINGS, ROLLS, RINGS, CORROSION AND HEAT RESISTING CASTINGS

Measure Printing Surface Improvements

When Surface is Sized With

KELSIZE

or one of the

KELGINS

Calender stack or size press applications of these hydrophilic colloids (applied as 0.20% —3.5% solution) increase surface resistance to ink penetration thereby improving printing uniformity, color yield and general appearance of the printed product.

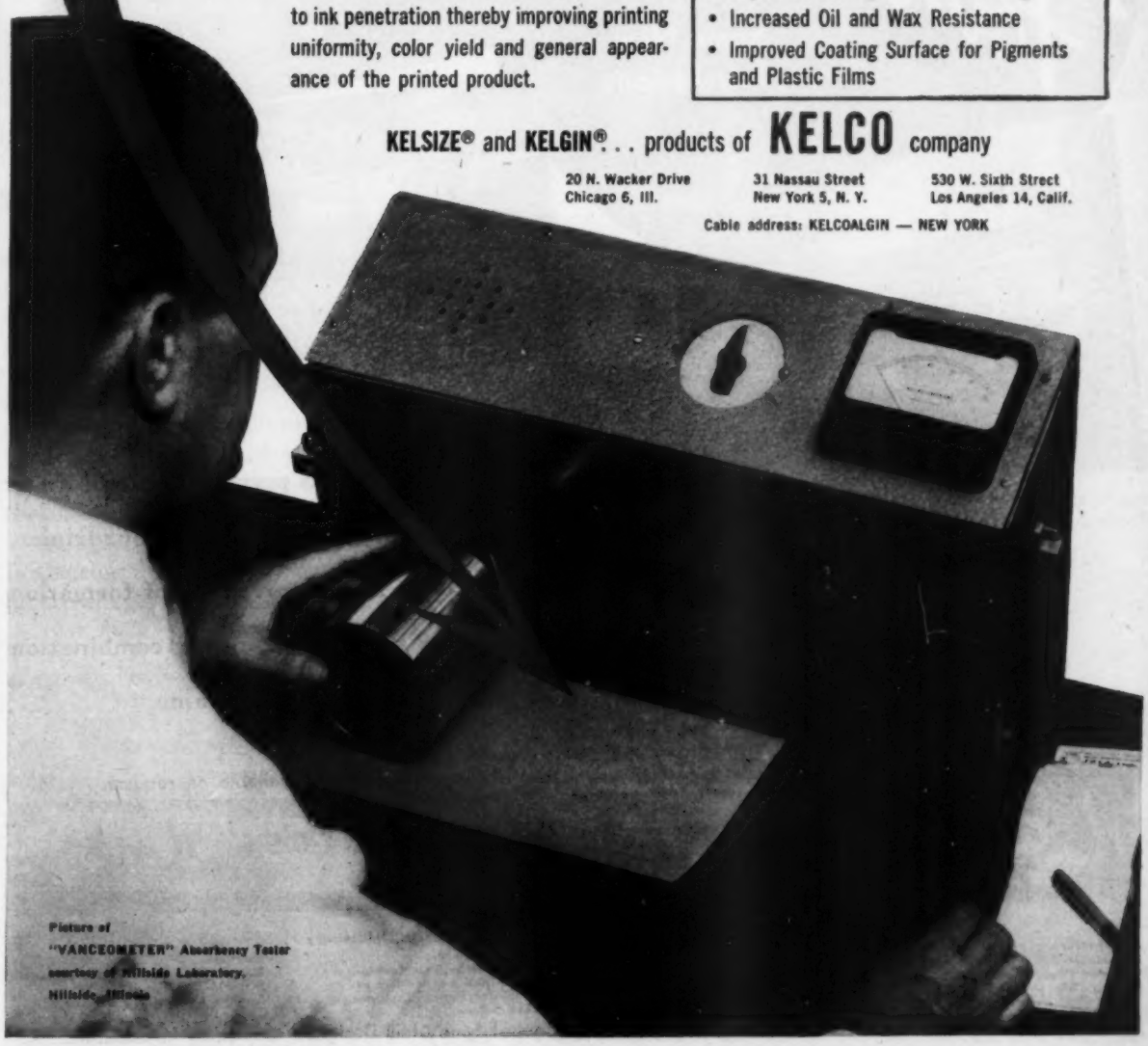
OUTSTANDING ADVANTAGES ARE:

- Uniformly Dense & Smooth Printing Surface
- Improved Gloss & Flat Ink Printing
- Increased Oil and Wax Resistance
- Improved Coating Surface for Pigments and Plastic Films

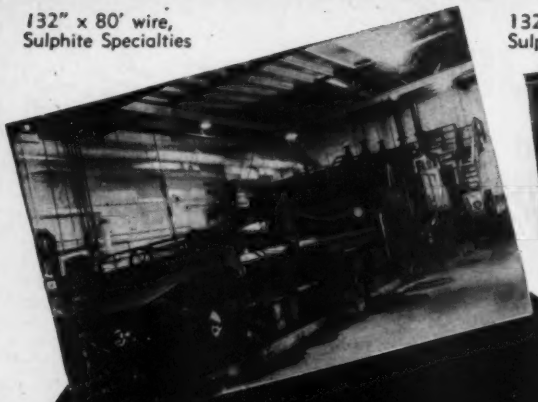
KELSIZE® and **KELGIN®**. . . products of **KELCO** company

20 N. Wacker Drive, Chicago 6, Ill. | 31 Nassau Street, New York 5, N. Y. | 530 W. Sixth Street, Los Angeles 14, Calif.

Cable address: KELCOALGIN — NEW YORK



Picture of "VANCEOMETER" Absorbency Tester courtesy of Hillside Laboratory, Hillside, Illinois



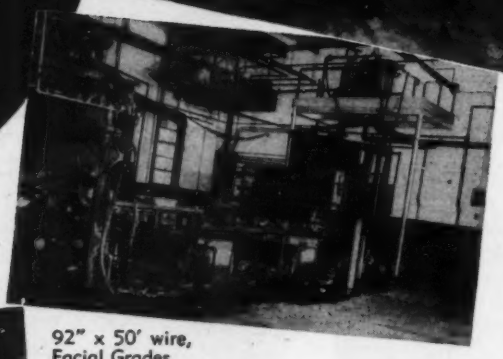
132" x 80' wire,
Sulphite Specialties

132" x 80' wire,
Sulphite Specialties

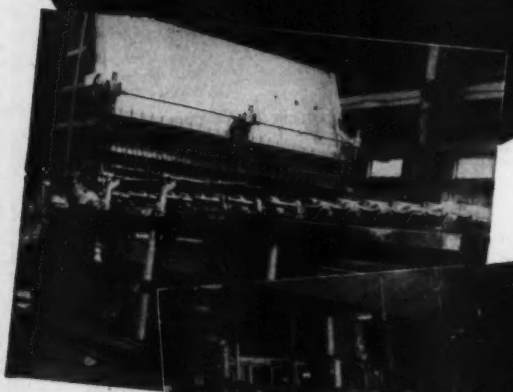
Sandy Hill Fourdriniers

Some New Installations

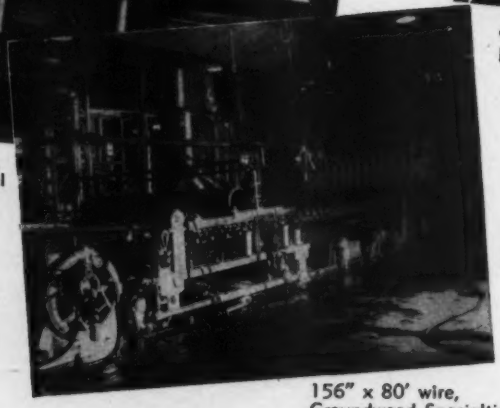
92" x 35' wire,
Toilet Tissue



92" x 50' wire,
Facial Grades



156" x 65' wire,
Tissue and Towel



156" x 80' wire,
Groundwood Specialties

Sandy Hill is prepared to build any type of paper machine fourdrinier, either for improvement of formation and production, or in combination with a complete machine.

Sandy Hill's Brochure of Pulp and Paper Making Machinery is available on request.

The Sandy Hill Iron & Brass Works

Hudson Falls, N.Y.

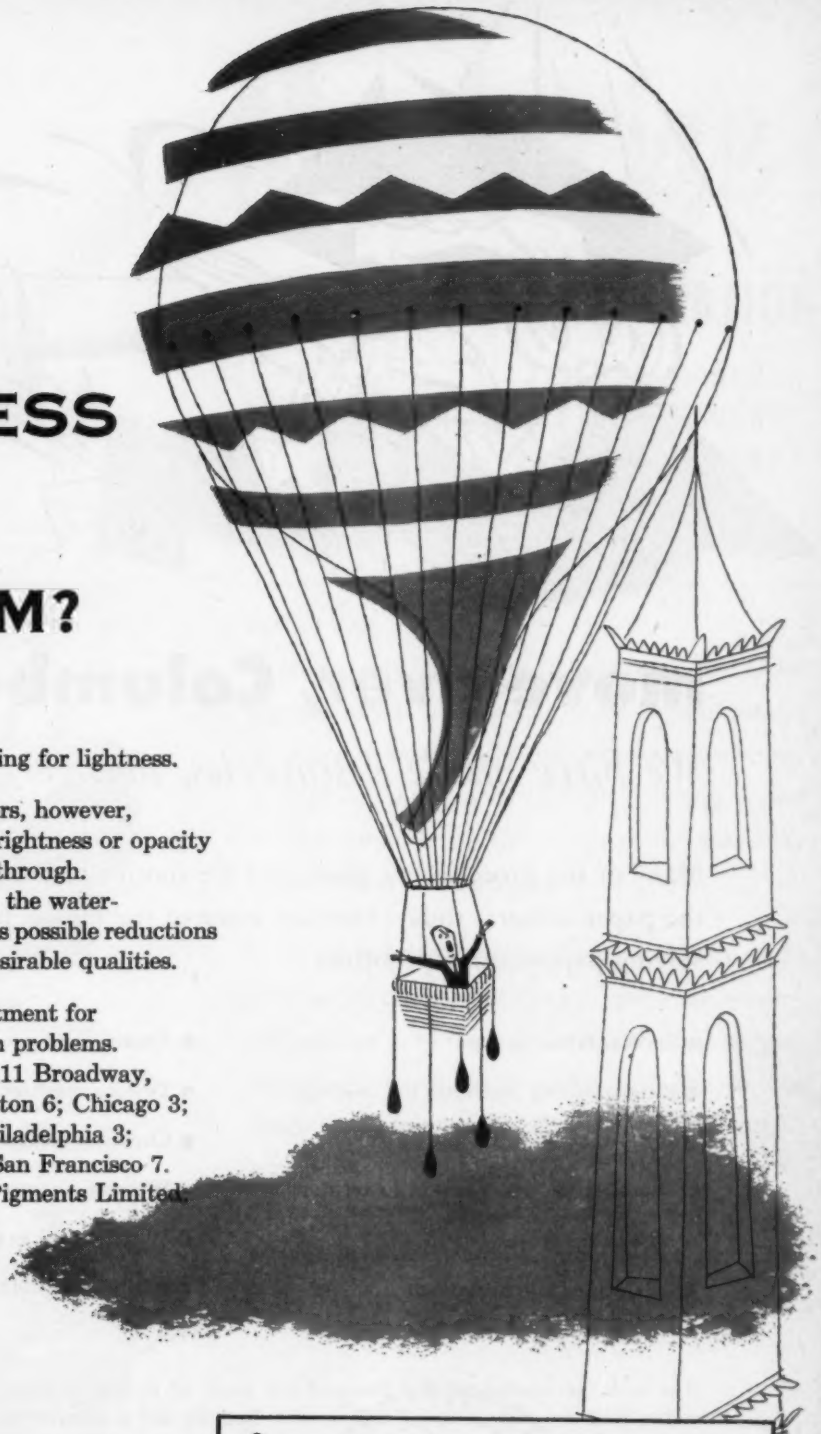
Machinists and Founders Specializing in Pulp and Paper Mill Machinery

Manufacturers of

- Adjustable Cylinder Vats
- Cylinder Paper Machines
- Kamyr Pulp Grinders
- Dandy Roll Drives
- Quick Opening Gate Valves
- Bertrams Flow Distributors
- Bertrams Shakes
- Kamyr Stock & Pulp Pumps
- Kamyr Vacuum Washers
- Nelson Slice
- Kamyr Feltless Wet Machines
- Selective and Corner Drives
- Fourdrinier Paper Machines
- Packer Screens
- Castings
- Kamyr Pulp Bleaching Equipment
- Scofield Felt Conditioners
- Yankee Fourdrinier Machines
- Yankee Cylinder Machines

Associated with Canadian Vickers, Ltd., Montreal, Builders of Sandy Hill Designed Machinery in Canada

LIGHTNESS YOUR PROBLEM?



In this spot you'd sacrifice anything for lightness.

Reducing weight in printing papers, however, can be done without sacrificing brightness or opacity and without an increase in show-through. Pigmentation with TITANOX-AWD, the water-dispersible titanium dioxide, makes possible reductions in weight while retaining these desirable qualities.

Ask our Technical Service Department for assistance with your pigmentation problems. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; Atlanta; Boston 6; Chicago 3; Cleveland 15; Los Angeles 22; Philadelphia 3; Pittsburgh 12; Portland 9, Ore.; San Francisco 7. In Canada: Canadian Titanium Pigments Limited: Montreal 2; Toronto 1.

® TITANOX

the brightest name in pigments

TITANIUM PIGMENT CORPORATION

Subsidiary of NATIONAL LEAD COMPANY

move over, Columbus!

We have made discoveries, too:

Many of the processes we pioneered are routine techniques in the paper industry today. Here are some of the Huyck *firsts* in solving papermaking problems.

- Endless fabric looms.
- Ring spinning machines for woolens.
- Satin-weave felt for fine finish.
- Double and twist yarns in heavy duty felts.
- Measuring wheel.
- Felt research department.
- Tension and pressure control methods.
- Testing machine for measuring openness of felt.
- Chemical treatment of felts.
- Wetting agents.
- Wear testing graphs.
- Bulletins on felt application methods.

The same "get-up-and-go" that produced this record of *firsts* is stronger than ever today. With our manufacturing and research facilities and a sound reputation for product performance, we can offer exceptional service on any felt problem.

KENWOOD TEXTILE PRODUCTS

HUYCK FELTS

First in quality... first in service.

F. C. HUYCK & SONS • ESTABLISHED 1870 • RENSSELAER, NEW YORK

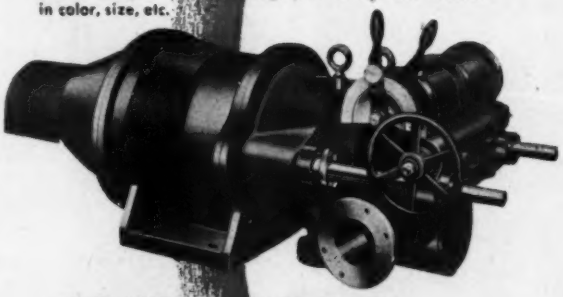
Morden-ize

YOUR STOCK PREPARATION

WITH Morden { SLUSH-MAKERS / STOCK-MAKERS / STUFF-MAKERS

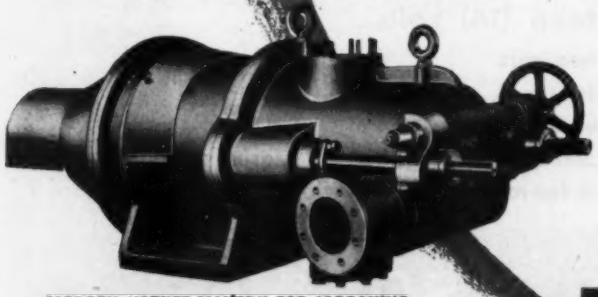
MORDEN "SLUSH-MAKER" FOR PULPING

The "Slush-Maker's" side-entering rotor quickly and efficiently slushes a full charge of pulp, broke or waste paper, either batch or continuous. The rotor's combination pumping, shredding and brushing blades continually direct the charge at right angles against the attritioning ring, where a controlled bar-to-bar brushing completely clears all flakes and bundles, even though wet strength, without damage to the fibers. The "Slush-Maker's" positive-flow circulation quickly and thoroughly mixes and also brushes in color, size, etc.



MORDEN "STOCK-MAKER" FOR BEATING

The "Stock-Maker" with its 360° bed plate gives the maximum of brushing, fibrillating, beating or hydrating treatment with the minimum of cutting. The "Stock-Maker" operates on a continuous-flow basis from chest to chest or chest to stuff box. The positive-flow, sealed pressure treatment of one "Stock-Maker" will duplicate or improve upon the stock treatment of two or three conventional beaters and yet requires only one-half the space of one beater.



MORDEN "STUFF-MAKER" FOR JORDANING

The "Stuff-Maker" utilizes the "Stock-Maker's" well proven construction features but provides a "jordan-type" flow, for shortening or cutting the stuff when required.

Experience with nearly 700 Morden Machines in 175 mills on all types of pulp and grades of paper proves that:

These three Morden Machines are especially designed, each to excel in one of the three phases of stock preparation—pulping, beating or jordaning.

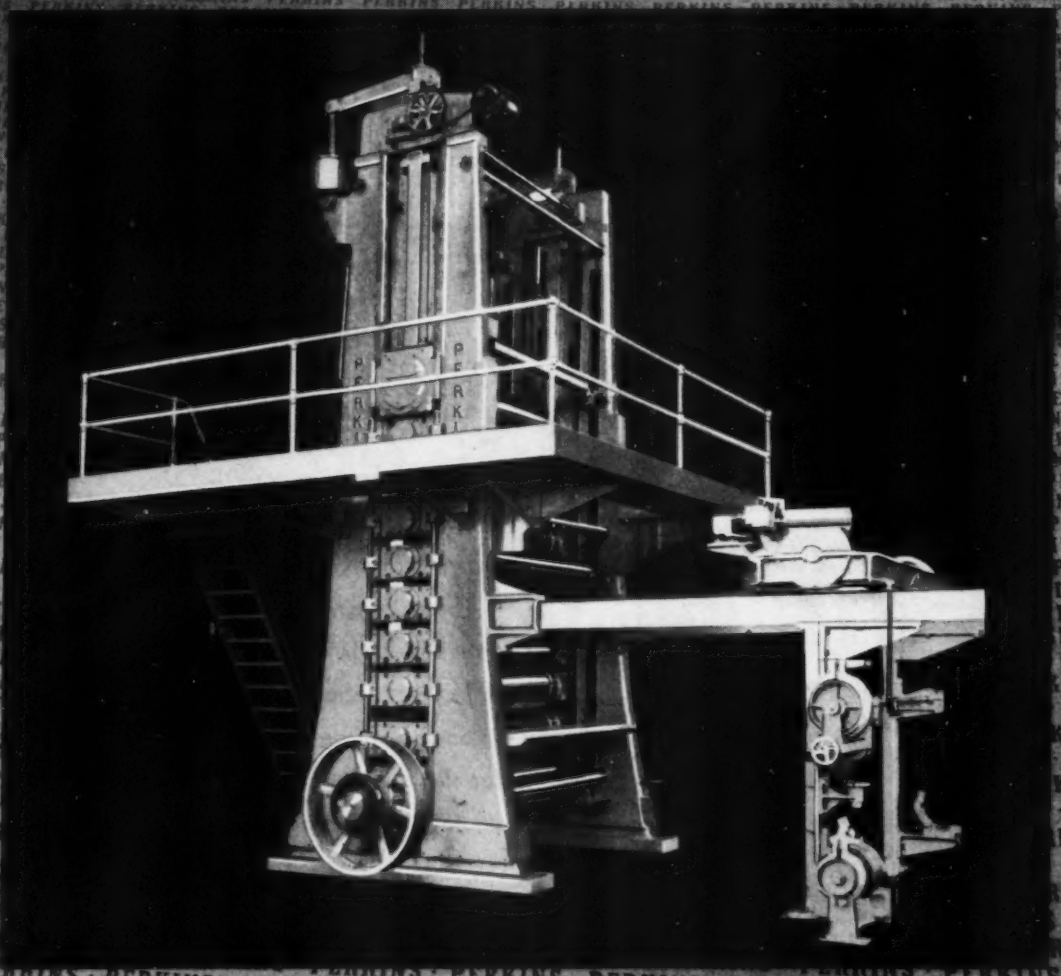
Each of these Morden Machines is engineered for the utmost in efficiency, simplicity, versatility and economy of operation.

These Morden Machines are designed to fit readily into all types of stock preparation systems and can be used together or in combination with existing equipment to give efficiently the various treatments required for developing the most in each furnish.

Let us know of your interest, and we will gladly provide detailed information on how to advantageously Morden-ize your stock preparation system.

MORDEN
STOCK PREPARATION EQUIPMENT
MACHINES COMPANY

Corbett Building, Portland, Oregon.



TEN TO FOURTEEN

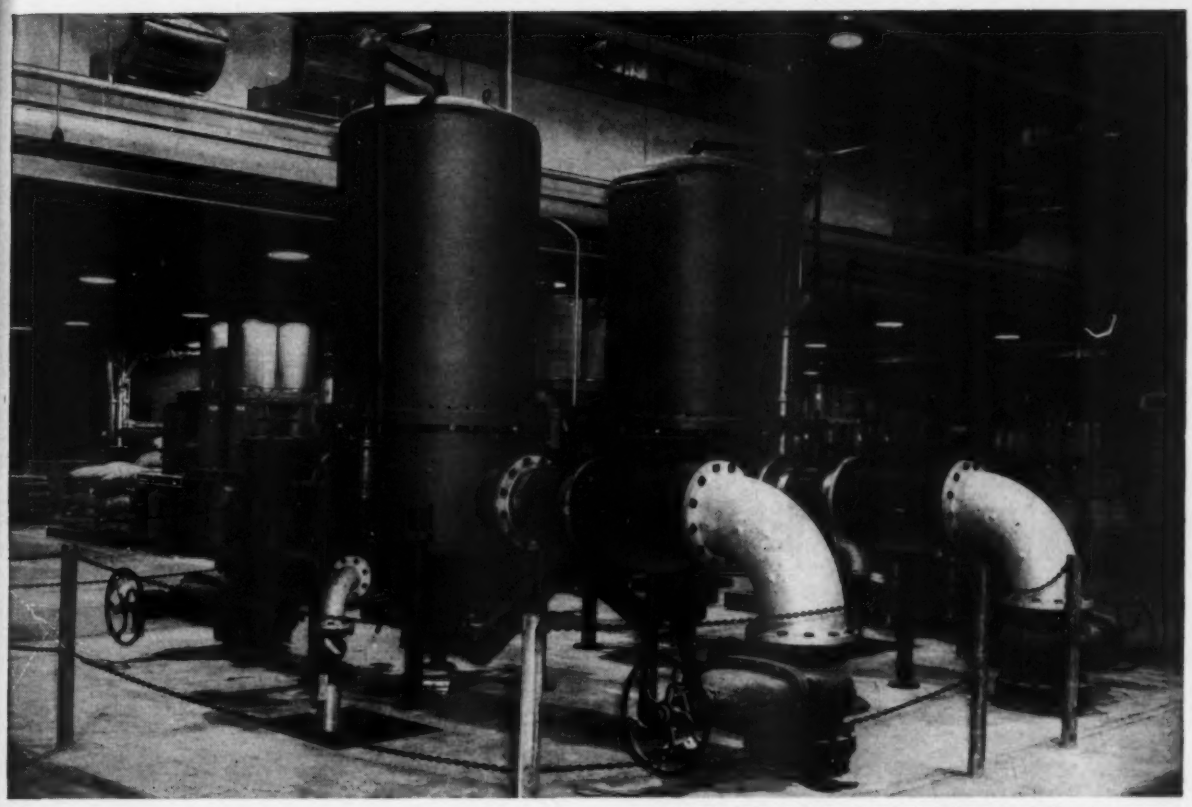
Perkins ten-roll 64″ face Web Supercalender with provision for fourteen (14) rolls.

- All rolls in Timken anti-friction bearings
- Stationary reel with electric hoist
- Lever pressure with pneumatic loading
- Fly rolls mounted in self-aligning anti-friction bearings
- Motor driven hoist for raising and lowering rolls

B. F. PERKINS & SON, Inc.

HOLYOKE, MASS., U.S.A.

LARGEST MANUFACTURERS OF CALENDER ROLLS IN THE WORLD



EVERY GRAIN OF SAND IS REMOVED from the well water passing through these abrasion-resistant FLO-KLEAN filters at the new Upjohn Company plant in Kalamazoo, Michigan.

Upjohn saves 2000 dollars a month

FLO-KLEAN filters protect valuable equipment at pharmaceutical plant

Maintenance records at the Upjohn Company's ultra-modern plant near Kalamazoo, Michigan, show that FLO-KLEAN filters are responsible for saving up to $2000 a month in maintenance costs.

These Cuno FLO-KLEAN filters, used to remove sand and gravel from incoming well water, ordinarily take something like a teaspoon of sand out of each thousand gallons. That doesn't appear to be an impressive quantity, but it could cause serious damage to stainless steel valves, pumps, water softeners, condensers and other valuable equipment. Purity of process water is assured by the high-capacity FLO-KLEAN units.

Recently the wall of one of their thirteen 250 feet deep wells gave way, dumping large quantities of sand and gravel into the water system. Every bit of this sudden deposit (almost seven cubic yards) was removed by the FLO-KLEAN filters. Without interrupting service, FLO-KLEAN continued its automatic operation and saved Upjohn a serious operating and maintenance loss.

In hundreds of applications throughout industry the fully automatic, continuously self-cleaning FLO-KLEAN filters have paid for themselves many times over by making river, lake, or well water fit for industrial use . . . and without loss of backwash water. Other uses include reclaiming industrial process water and coolants. If you need or use between 200 and 100,000 gallons per minute of clean water, find out how FLO-KLEAN can save you money. Write for free FLO-KLEAN bulletin to the Cuno Engineering Corporation, Dept. 391-F, Meriden, Conn. 3.1

CUNO

ENGINEERED FILTRATION

Removes More Sizes of Solids From More Kinds of Fluids

AUTO-KLEAN (disc-type) • MICRO-KLEAN (fibre cartridge) • FLO-KLEAN (wire-wound)

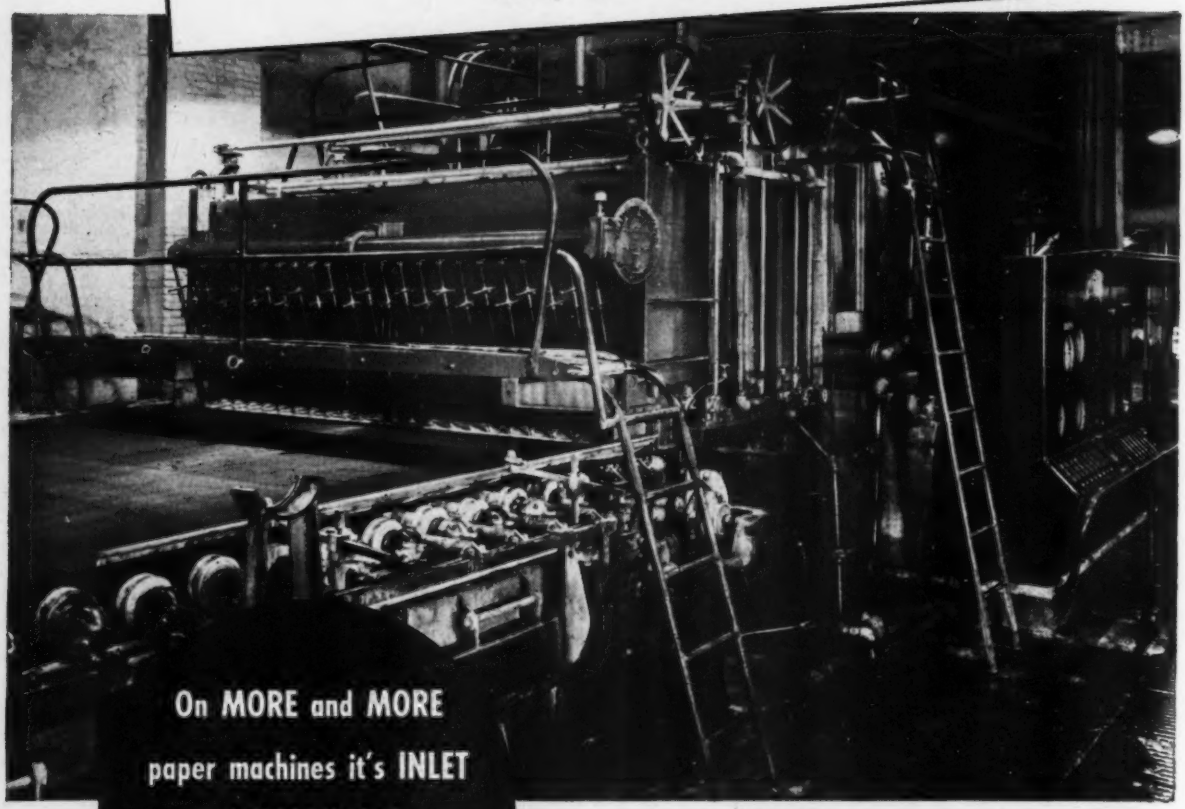
AGAIN . . . it's INLET and HEADBOX by

VALLEY

New No. 11 Fourdrinier at

E. B. EDDY COMPANY

Hull, Quebec



On MORE and MORE paper machines it's INLET and HEADBOX by

VALLEY

Consult

VALLEY IRON WORKS CO.

APPLETON, WISCONSIN

FORMATION · CALIPER · LEVEL SHEET · INCREASED SPEED · HIGHER TEST

How a Smallpox Epidemic Started the First Mass Production of Paper!

In A. D. 735 a smallpox epidemic struck Japan. To drive out the "evil spirits" believed to have been the cause of the disease, Empress Shōtoku sanctioned the printing of a million paper prayers. Each prayer was to be enshrined within an ornate wooden pagoda eight inches high and approximately four inches in diameter at the base. Requiring six years to complete, the project led to the first large-scale production of paper and to the world's first text printing upon sheets of paper. Just as this event contributed to the progress of paper-making, A. E. Staley Manufacturing Company promotes progress in modern papermaking by supplying high-grade raw materials to the nation's leading mills. Contact your supplier or write direct for details.

QUALITY
STALEY® PRODUCTS
FOR PAPER MAKERS

Staley Sizing Starches
A full range of starches and dextrins for beater, surface or calender sizing.

Staley Corrugating and Laminating Adhesives
Finer corrugating starches, special laminating and bag adhesives.

Staley Coating Adhesives
Starches and dextrins give better results for machine or brush coating.

Staley Plasticizers
"Sweetose" and Staley's corn syrup are ideal softening agents for glassine paper.

PRODUCTS FROM CORN
Staley's

A. E. Staley Mfg. Company, Decatur, Ill.

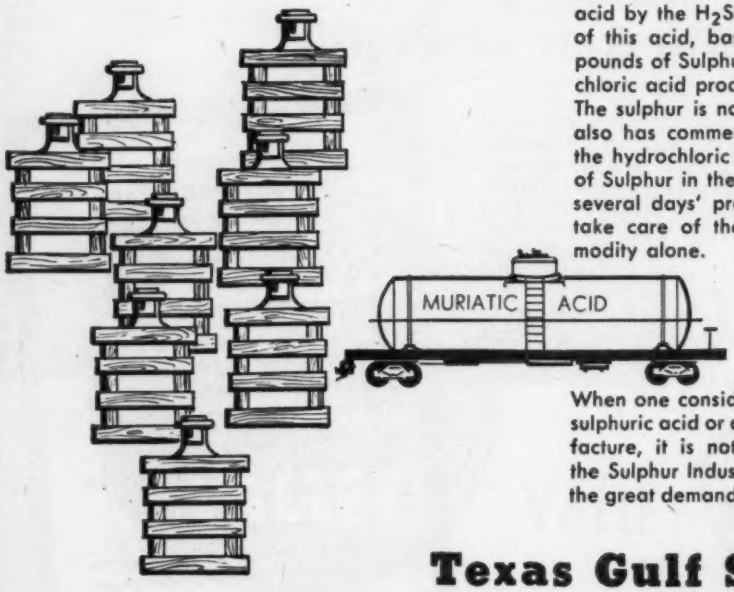
Sulphur

Loading a ship with Sulphur at Galveston

Thousands of tons mined daily, but where does it all go?

PARAPHRASING an old saying: 'It takes a chemical to make a chemical,' certainly applies to hydrochloric acid.

No chemical engineer has to be told how hydrochloric acid is made but sometimes with the mind focussed on the word "hydrochloric" little thought is given to another word "sulphuric." It is this word that calls attention to the fact that to make one net ton of 20° Bé hydrochloric acid by the H_2SO_4 process requires about 950 pounds of this acid, basis 100%, which is equivalent to 320 pounds of Sulphur. About one third of the annual hydrochloric acid production is made by the use of sulphuric. The sulphur is not lost because salt cake, a by-product, also has commercial value. But any way you figure it, the hydrochloric acid industry is an important consumer of Sulphur in the form of sulphuric acid. In fact, it takes several days' production from all the Sulphur mines to take care of the annual production of this one commodity alone.



When one considers all the other chemicals that require sulphuric acid or other Sulphur compounds for their manufacture, it is not difficult to appreciate how faithfully the Sulphur Industry is serving industry today in spite of the great demands made upon it.

Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N. Y.

Mines: Newgulf and Moss Bluff, Texas

Smooth Board Sells and Stays Sold!

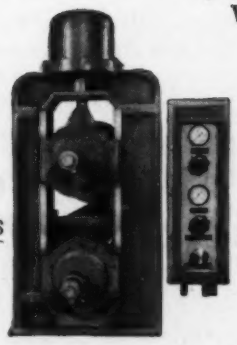
Improve your finish with a Manchester Smoothing Press

Here is the simplest, surest smoothing press ever designed—one that will give you *uniformly smooth board* on all your orders.

Your customers will like the consistently smooth surface you can give them with a Manchester Smoothing Press, even for exacting multi-color press work. This means satisfied users, repeat sales, better profits.

Note these important features of the Manchester Smoothing Press. It is simple, has no unnecessary moving parts. It is easy to install, easy to operate. Completely air-controlled, it offers you final proof of its efficiency in *greatly improved finish and uniform caliper of board.*

Look into the Manchester Smoothing Press today. Write for all the facts.



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OTHER PRODUCTS: WINDERS • ADJUSTABLE SHAKE MOTION POPE TYPE REELS • PAPER MACHINE DRIVES • SIZE PRESSES RUBBER-COVERED DRILLED SUCTION PRESS ROLLS • DRILLED SUCTION DRUM ROLLS • DRILLED SUCTION COUCH ROLLS CYLINDER MOULDS • COMPLETE FOURDRINIER

THE VANDERBILT LABORATORIES

Norwalk, Conn.

★

For Testing and Developing
Methods of Improving
Paper Products

★

R. T. VANDERBILT CO., INC.

230 Park Avenue, New York City

The Paper Industry

September 1953

Aggressive selling and advertising—a cure for recession

In a new booklet "Hidden Expansion Pressures in our Economy" published by Reinhold Publishing Corporation, author Arno H. Johnson administers a well-timed stimulant to the business world by discrediting the widely prevailing fears of a business recession that is to follow any drastic curtailment in defense spending.

The point that Mr. Johnson makes is that a rise of only 5 per cent over the 1952 level of consumer purchases of $216,000,000,000 would offset the $10,000,000,000 cut in government defense spending. Since some 54 per cent of present income, after taxes, is available for "discretionary spending" (the amount over and above that needed to supply such necessities as food, clothing, and shelter, etc.), a 5 per cent increase in consumer purchases would seem a comparatively simple accomplishment.

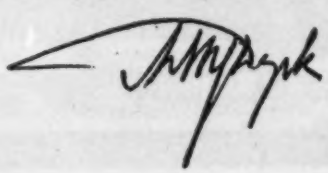
There is, however, to be considered the public's inherent inertia to change, even where it involves a change toward a higher standard of living. To overcome this inertia is the challenge that today confronts the manufacturer or business executive. The task is that of educating the public to change its habits and adopt a higher standard of living which is more in line with the nation's productive ability. If successfully tackled—with imagination and resourcefulness—any effort directed toward this end can pay off immeasurably.

American economy—in contrast to that of most other nations—is based largely on creating new wants rather than satisfying essential needs. The creation of new wants, and have these accepted by the public, therefore, is a task in which American business has had considerable experience; although the seller's market which has prevailed during the past decade has left the industry somewhat rusty in the practice of this art.

With a well-planned and aggressive program in advertising and selling, a sufficiently increased demand can be created to raise consumer purchases by at least 5 per cent. Moreover, the onus here is not entirely with the manufacturer. As pointed out by Johnson, there are a number of hidden pressures in our economy that will contribute toward the expansion of old and new markets. These include: (a) as already stated, the public's unusually high "discretionary spending power" amounting to $134,000,000,000, (b) a higher education level which tends toward a higher standard of living as well as creating new demands for schools and related facilities, (c) the obsolescence, in terms of modern standards, of the majority of our buildings, (d) the increasing number of automobiles on our roads which are creating demands for abolishment of congestion areas and the building of new and improved roads and parking facilities.

All these factors offer an unusual opportunity for peace-time business activity. It is not likely that government, industry, and business will fail to make full use of this opportunity and neglect conditions under which production incentive, sales and production ingenuity, and industrial advertising are given full scope to keep business and production at a high level of activity.

It is, of course, recognized that conversion to peace-time economy does not come automatically or without its usual disturbing effect on the hypersensitive business barometer. All considerations, however, do give business the green light, once a new confidence is gained and the adjustment to a new peace-time equilibrium is completed.



For complete satisfaction, install POWELL VALVES

To be completely satisfactory, a valve must function perfectly, give maximum length of service and require minimum maintenance. To do this it has to be exactly right—in design and materials—for all the conditions under which it must operate. And because Powell makes just such a valve for every service in modern industry, Powell Valves always give complete satisfaction.

The Wm. Powell Co., Cincinnati 22, Ohio

Fig. 1893—Flanged end Gate Valve designed and developed especially for Paper Mill service. Body, bonnet and yoke are 3½ Nickel Iron; screwed-in seat rings are 18-8 SMo; solid wedge is Ni-resist.

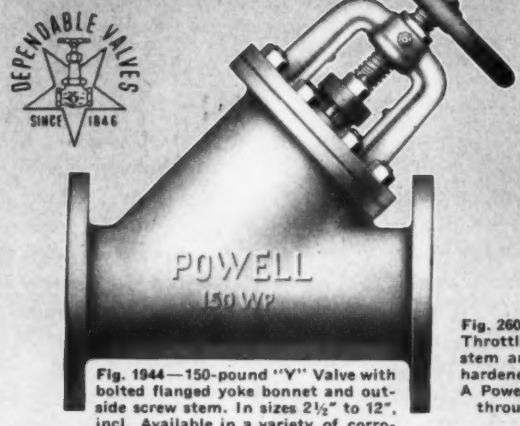


Fig. 1944—150-pound "Y" Valve with bolted flanged yoke bonnet and outside screw stem. In sizes 2½" to 12", incl. Available in a variety of corrosion-resisting metals and alloys.

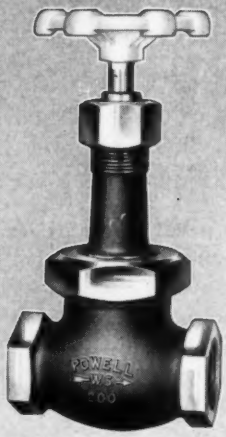
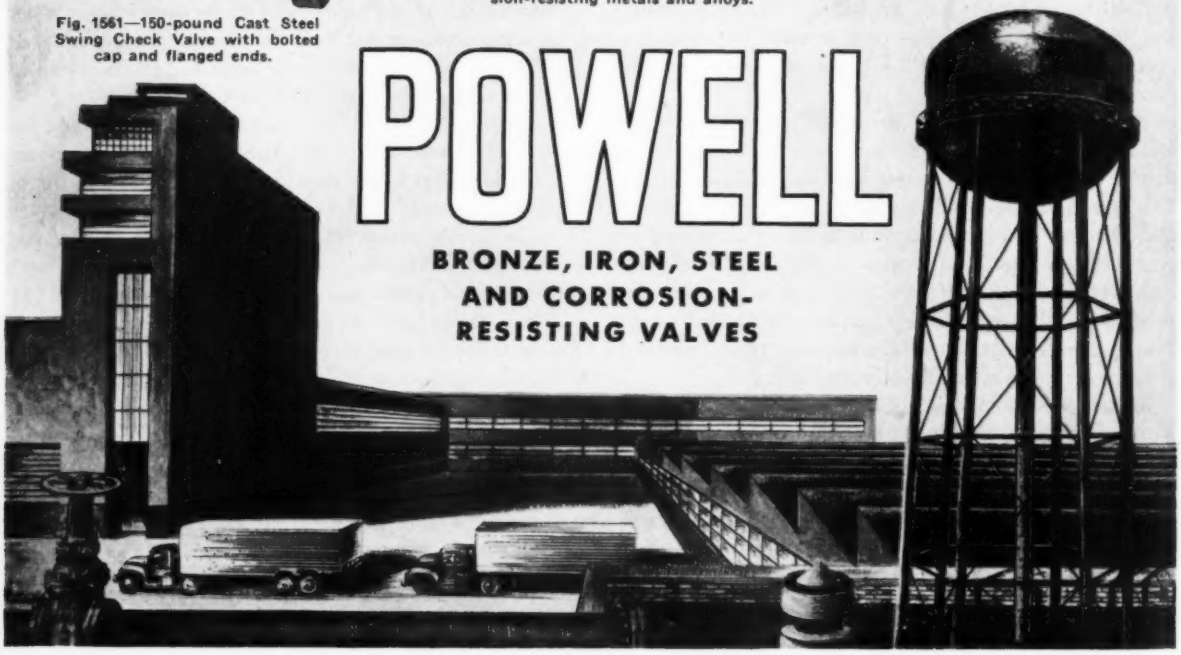


Fig. 2608 — 200-pound Bronze Globe Throttling Valve with special bronze stem and stainless steel disc and seat, hardened to approximately 500 Brinnell. A Powell design that permits full flow through the seat when wide open.

Fig. 1561—150-pound Cast Steel Swing Check Valve with bolted cap and flanged ends.

POWELL

BRONZE, IRON, STEEL AND CORROSION-RESISTING VALVES



VIRGIN

The Paper Industry Current Comment

Tariffs . . . foreign trade picture . . . new FTC approach . . . migration of capital . . .

The internationalist bloc in industry has been temporarily stymied by the concluding legislation passed by Congress and approved by President Eisenhower. The pro-import group which has been vocal in its efforts to lower the so-called United States barriers to foreign trade will have to wait until next year before any new proposals will be acted upon by Congress.

Tariff legislation

The personnel of the Foreign Economic Policy Commission has not been completed, as President Eisenhower's list of seven members has not been announced. It seems definite that Clarence Randall, chairman of the board of Inland Steel Corp., will be named chairman of the commission. Randall is the man who was the spokesman for the entire steel industry against President Truman's seizure of the mills in the steel strike imbroglio. There have been newspaper reports that one of the paper industry's best informed authorities on foreign trade will be another Eisenhower designate. The speaker of the house and Vice-President Nixon have already named the ten members, five each from each house of Congress, and there has been as nearly as possible an even break on protectionist and free trade devotees.

The internationalists, however, are temporarily blocked, because tariff legislation in the first session of the present session of Congress was definitely stalled by the determination of all parties to await the report of the new commission before making any radical changes in present procedures. That commission is to report in not over 60 days from the reopening of Congressional sessions July 6.

In short, the legislation as finally enacted and signed continued the Reciprocal Trade Agreement Act "as is," pending the report of the commission, whose establishment was a part of the renewed act. The demand of the House for the expansion of the tariff commission to seven, in order to block the veto power of any three members of the commission, was dropped with the change of the law to refer any questions on which there might be an evenly divided vote in that commission to the President for decision, as to whether an investigation under the escape clauses of the Reciprocal Trade Agreement Act shall be initiated. The President, however, has indicated that he is likely to defer any tariff decision until the new Foreign Economic Policy Commission has rendered its report.

The Customs Simplification Bill was passed, after the deletion of the controversial provision as to the method of valuation of foreign merchandise for duty purposes. A new bill to allow detailed study of this issue was promptly passed by the House and will go to the Senate finance committee for the investigation it reported as being advisable.

A paper industry matter

This foreign trade problem is very much a paper industry matter. It was the paper industry which first of all industries went to Congress with its recommendation that tariff legislation be deferred pending a complete review of the entire tariff and foreign trade legislative picture, with possibly some entirely new approach to this question. It was the paper industry which in the last Administration was at least partly responsible for the refusal of the Senate finance committee to approve the so-called Customs Simplification Bill with its concession to the foreign traders of the right to fix the value on which this government would be required to compute duties. This showing resulted in the deletion of the controversial issue from the bill as passed and signed.

Meanwhile both sides to the controversy are girding their loins for a 1954 battle. The organization of groups complaining of foreign competition is scheduled to meet in September, and a new free trade group is being formed to be called the Committee for a National Trade Policy.

No unjustified nagging

The Administration's policy as to operations of the Federal Trade Commission in combatting price fixing is still not entirely charted. The case against the blotting paper manufacturers which was heralded as a great accomplishment of the old Truman commission will doubtless be dropped by the revised commission, as the practices complained of eleven years ago have long since been abandoned. It was a special talent of the old commission to blast industries for practices which had already been abandoned, and claim victory because the industries accepted court rulings estopping their continuance of procedures long since dropped.

A case started by the old commission against Crown Zellerbach and two marketing companies charged with inducing and receiving price discriminations from paper sellers has been dropped. However, General Motors has been ordered to give up exclusive dealing contracts with distributors of spark plugs. It seems to be the program of the revised commission to prosecute any real anti-trust law violators but to abandon tortuous interpretations of the laws and to cease unjustified nagging of legitimate operators.

Output high

The paper market seems destined to complete the year with a tonnage output close to the record year of 1951. Higher prices have been charged for the higher grade book papers, as demands of publishers for more paper to carry the increased advertising has stepped up demand. Normally such an increased demand and consequent price adjustment would follow in the higher grade writing papers.

A New York Journal of Commerce compilation shows that fifteen paper companies experienced an increase in net earnings in the second quarter of 1953 of 8.4 per cent over the earnings of these companies in the same quarter a year ago.

Trends in foreign trade

A significant trend in foreign trade was shown during the past month by the announcement of the Ford Company

that it was importing farm tractors from its European plants to be marketed through its domestic sales organization. The company has already been importing a foreign made passenger car, also marketed as a special model, through its normal distributional channels. The Royal Typewriter Co. is opening a new factory in Holland to manufacture machines for Holland and "export markets."

A steel manufacturer has returned from a trip abroad convinced that some domestic industries, though he did not name paper, cannot survive in the face of material foreign competition, when American wages are $2 an hour as against a quarter of that figure in comparable foreign mills. This is about the wage relationship between United States and Scandinavian paper mills. He also said that the nations most vociferous in demanding a cut in tariff rates are those which levy duties of four to five times those of the United States.

Capital migration

The migration of American capital may have an eventual impact on American labor. Excessive wage demands may accelerate the movement of American capital to lower wage countries, which could then supply the American market at prices below those possible for the home made goods. It might be wondered whether some of the industrialists who are urging further United States duty rate reductions might be throwing out an anchor to windward to protect them from increasing wage demands in the future. Domestic labor unions which urge such foreign investments may be piling up future misery for themselves. Not likely to be soon, but could be eventually.

Financial Reports

Investor psychology which has adversely affected the securities markets in recent weeks had its impact on the paper mill issues. Mid-August showed averages well down toward the lows of the year, but the market dried up with every drop in prices, indicating that large holders of securities of all types are not liquidating their holdings.

Net Incomes

Abitibi Power & Paper Co. Ltd.—Net profit for six months ended June 30 was $4,763,220, compared with $4,404,055 last year.

American Can Co.—Net profit for six months ended June 30 was $12,421,109, compared with $10,315,428 for the same period in 1952.

American Writing Paper Co.—Net income for the first half year was $282,981, as compared with $119,035 a year ago.

A. P. W. Products Co.—In the first half of 1953 the company showed a deficit of $62,520, compared with a net profit of $26,240 in the first half of 1952.

Brown Co.—Net income for the first 28 weeks of 1953 was $1,475,425, as compared with $3,107,414 for the comparable 1952 period.

Celanese Corp. of America—Net income for the first half of 1953 was $6,438,296, compared with $1,159,896 in the like half of 1952.

Certain-Teed Products Corp.—Net profit for six months was $1,790,178, compared with $1,626,225 last year.

Champion Paper & Fibre Co.—Net income for three months ended June 30 was $2,508,317, as compared with $2,384,167 in the comparable quarter of 1952.

Consolidated Paper Co. Ltd.—Net profit for the six months ended June 30 was $5,257,239, compared with $5,506,693 a year ago.

Continental Diamond Fibre Co.—Six months net earnings in 1953 were $426,259, as against $378,522 for that period a year ago.

Crown Zellerbach Corp.—Net income for the year ended April 30 dropped to $21,889,705, compared with $23,923,919 for the preceding fiscal year, although sales were up to a new record, and 3 per cent above the previous year.

Dennison Mfg. Co.—Six months income was $818,000, compared with $750,000 in the like period of last year.

Dixie Cup Co.—Net six months income was $1,346,318, as against $1,143,544 a year ago.

Dryden Paper Co.—Net profit for six months to March 31 was $371,698, compared with $693,079 a year earlier.

Gair Co. Inc. (Robert)—Net income for the first half of 1953 was $3,226,342, as compared with $2,627,837 in 1952.

Paper mill corporate changes

Combined Locks Paper Co. is offering 100,000 shares of Class A common stock at $12.50 per share. Proceeds of the sale, which began August 18, will be applied toward the balance of the cost of completing the expansion and improvement program at the D. M. Bare Paper Co. plant in Roaring Spring, Pa., a Combined Locks subsidiary. The additions, including the new bleached kraft pulp mill, are scheduled to be completed in 1954. The stock sale is being handled by twelve underwriting firms.

Crown Zellerbach Corp. has voted to amend the articles of incorporation to permit an increase in authorized common shares from 7,500,000 to 15,000,000.

Northern Paper Mills has called all of the outstanding shares of $100 par value preferred stock, second issue, of the corporation for redemption on September 10 at a total redemption price of $104.184 per share. The total is equal to $103 per share and accrued and unpaid dividends thereon at the rate of 6 per cent per annum, being dividends from July 1, 1953, and including September 10, 1953, in the amount of $1.184 a share. Certificates are to be surrendered for redemption at Northern's Green Bay, Wis., office.

River Raisin Paper Co. borrowed $500,000 on a 4½ per cent note, due March 1, 1965, from the Prudential

Insurance Co. The proceeds will finance part of the building and equipment cost of a new $800,000 plant at Sharonville, Ohio.

St. Regis Paper Co., holder of over 66,000 shares of Dryden Paper Co. Ltd. common stock, is expected to accept an offer by Anglo-Candian Pulp & Paper Co. Inc. of one share of Anglo-Canadian and $35 for each share of Dryden. A majority of Dryden stockholders are staid to have agreed to the offer by Anglo-Canadian.

West Virginia Pulp & Paper Co. directors and those of Hinde & Dauch Paper Co. have approved a program for the issuance of West Virginia stock to Hinde & Dauch stockholders. It will be necessary to secure the formal approval of stockholders of both companies later in the year. Under the announced program, the outstanding common stock of West Virginia will be split four-for-one, and Hinde & Dauch stockholders will receive one and one-third West Virginia shares for each share of their present holdings. The present common stock authorization of West Virginia will be increased to 7,500,000 shares of $5 common. As of the close of the New Stock Exchange August 19, West Virginia common was quoted at $80 and Hinde & Dauch at 29 6/8. There had been rumors that Hinde & Dauch was involved in merger negotiations, but it had been thought that the other party to a merger would be St. Regis.

New York Stock Exchange—Stocks
Closing Prices

	Aug. 20, 1953	July 20, 1953
A.P.W. Products	* 3⅛–3⅜	* 3⅛–3⅜
Celotex	16½	17
Same Preferred	* 16⅛–16¼	* 16⅛–16½
Certain-teed Products	13⅞	13⅞
Champion P.&F. Co.	31¾	27⅝
Same Preferred	* 98½–100	100½
Chesapeake Corp.	* 28–28¼	* 27½–28¼
Container Corp.	39¾	39⅝
Same Preferred	* 99½–100½	* 97⅝–99
Continental Diamond	10⅝	11⅛
Crown Zellerbach	29⅛	28⅝
Same Preferred	95½	98½
Dixie Cup	* 37½–37¾	* 34¼–35
Eastern Corp.	* 14–14⅜	* 14⅜–15
Robert Gair	17⅞	18
Gaylord Container	25	* 25⅜–26
Hammermill	13¾	* 14–14¾
International Paper	50⅜	50⅛
Same Preferred	* 98¼–100½	* 96–98¼
Kimberly-Clark	41¼	* 42⅜–42¾
MacAndrews & Forbes	* 41¾–42	41
Marathon	19	19⅛
Masonite	18	19½
Mead Corp.	25¾	26½
Same Preferred	* 80–89½	* 87½–89½
National Container	9⅝	10½
Ravonier, Inc.	25¾	26⅛
Same Preferred	* 31¾–32¼	31
Scott Paper	63¼	59½
Same $3.40 Preferred	* 86–88	* 86½–88
Same $4 Preferred	*100¼–100½	*100¾–101⅛
St. Regis Paper	20⅛	22⅝
Same Preferred	* 93–93	* 92¾–93¼
Sutherland Paper	27¼	27
Same Preferred	105	*103–104
Union Bag & Paper	43⅜	43⅜
United Board & Carton	* 13¾–14	* 13⅝–14⅛
United Wall Paper	* 2¼–2¾	2⅜
Same Preferred	* 20½–22	* 21–21½
U.S. Gypsum	100½	107½
Same Preferred	*167½–169	*165–167
West Virginia P.&P.	82	73
Same Preferred	*105–106	*104¾–106

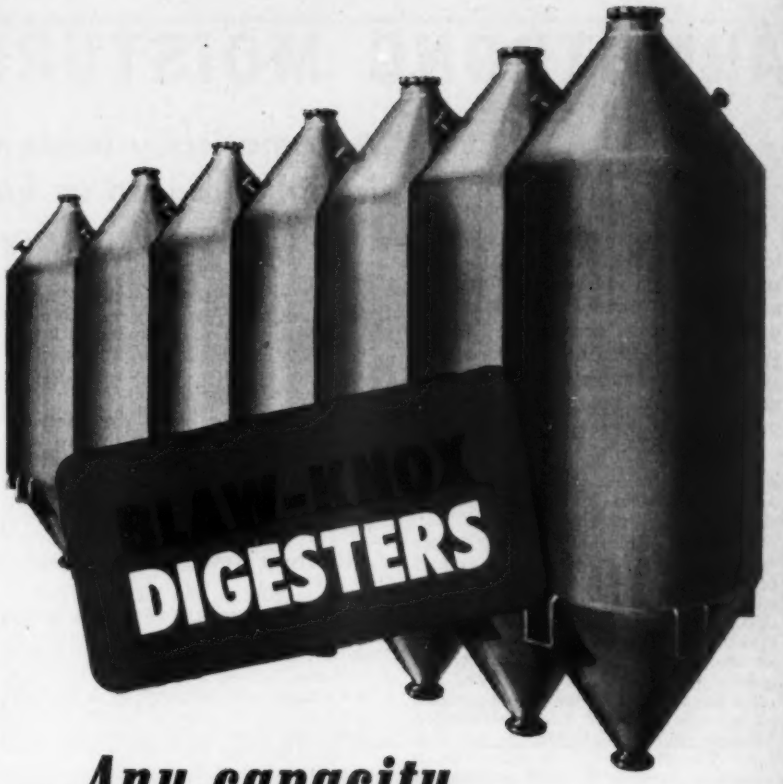
New York Stock Exchange—Bonds

Celotex 3½%	.....	98⅝
Champion P.&F. Co. 3%	.....	.....
Mead Corp. 3%	.....	.....

American Stock Exchange—Stocks

Am. Writing	.....	10⅝
Brown Co. Common	8½	9¼
Same $5 Preferred	.....	.....
Same $3 Preferred	50	.....
Great Northern Paper	52½	52½
Puget Sound	.....	26¾

*Closing Bid and Asked Prices.



Any capacity... any purpose

Between chips and pulp your digesters act almost as "catalysts"—indispensable to the process of paper-making. Their efficiency and length of useful life determine their productive worth.

The choice of Blaw-Knox digesters for many important mills has been prompted by our pioneer work in this field and our unequalled experience in building efficient vessels for processing Paper, Cotton, Wood and Organic Materials. To be better acquainted with our abilities and facilities *write today for Bulletin No. 2403.*

BLAW-KNOX COMPANY
BLAW-KNOX EQUIPMENT DIVISION
Pittsburgh 22, Pa.

BLAW-KNOX

ARMSTRONG MOISTURE CONTROL

Automatically holds very uniform moisture in either board or fine paper as it leaves the dryer rolls.

Utilizing an *indicating dryer* to measure the moisture in the sheet, then acting through a moisture detector and main pressure regulator, the Armstrong Control changes the pressure on the machine to hold moisture at the desired level and within desired limits.

The Armstrong Moisture Control is simple in principle and very sensitive to slight changes of moisture in the sheet.

Briefly described, one dryer (Indicating Dryer) very near the dry end of the paper machine is held at a constant pressure. The work done by this dryer is measured by passing the steam to the dryer through an orifice as in a steam meter. The pressures before and after this orifice are applied to two bellows which press down on a beam balanced on a knife-edged fulcrum midway between the two bellows. The differential or difference in pressure exerted by each bellows is balanced by a movable weight on the beam. This forms an instrument referred to as the Moisture Detector.

Another instrument, the Main Pressure Regulator, has a beam supported on a knife-edge fulcrum. Pressure from the main steam supply to the paper machine is applied to a bellows which acts on the beam of the Pressure Regulator 1" from the knife-edge fulcrum support. On the other side of the fulcrum, a weight is mounted on a screw rotated by a reversible motor, and can be moved to balance the pressure exerted by the bellows. This weight also can be manually moved on the screw and placed in any position on the graduated beam. The Pressure Regulator will then operate the main steam valve (either electrically, or by compressed air) to bring the steam in the dryers to the pressure indicated by the weight on the graduated beam.

Starting Up

When first bringing the paper over the machine, the steam pressure is adjusted manually until a sheet of the desired moisture is obtained. During this time, the Moisture Detector will be balanced automatically. Then, by throwing a switch, the automatic moisture control is in operation. Variations in steam flow to the Indicating Dryer will now affect the Moisture Detector. Any change in the moisture content of the sheet, either more or less than that for which the Moisture Detector is set, will put this instrument out of balance and cause it to operate the motor on the Main Pressure Regulator. This, in turn, will change the pressure in the dryers until the sheet is brought back to the required moisture content and the Moisture Detector is again in balance.

When the change in the sheet is very gradual, the steam pressure will change slowly — perhaps 1 lb. in 30 minutes, but if the paper change is sudden, steam pressure may change as much as 1½ lb. per minute.

Moisture Detector Operation

The switch on the Moisture Detector that operates the reversible motor on the Main Pressure Regulator is shown in Figure 2. The two electric contacts R and L are mounted on a bar raised and lowered by a cam on a small motor. One complete oscillation takes place every 30 seconds. The common contact "C" is on a flexible arm, and is moved up or down by any changes in the position of the beam of the Moisture Detector. When the Moisture Detector is "in balance" on a sheet of the desired moisture content, contact "C" is midway between the two contacts R and L. The cam movement of these two points is just enough to bring them close, but not to touch contact "C". Very slight change in the moisture of the sheet will cause contact "C" to be moved to make a momentary contact with either R or L at each revolution of the cam.

Of course, a greater change in the moisture of the sheet will move contact "C" to make longer contacts on R or L, and thus cause the pressure in the dryers to be changed more quickly and to a greater extent until it has corrected the moisture in the sheet and the Moisture Detector is again in balance, with contact "C" again midway between the contacts R and L.

Indicating Dryer Operation

The steam supply to the Indicating Dryer is taken from a separate line, so that it is not subject to the pressure variations in the main steam

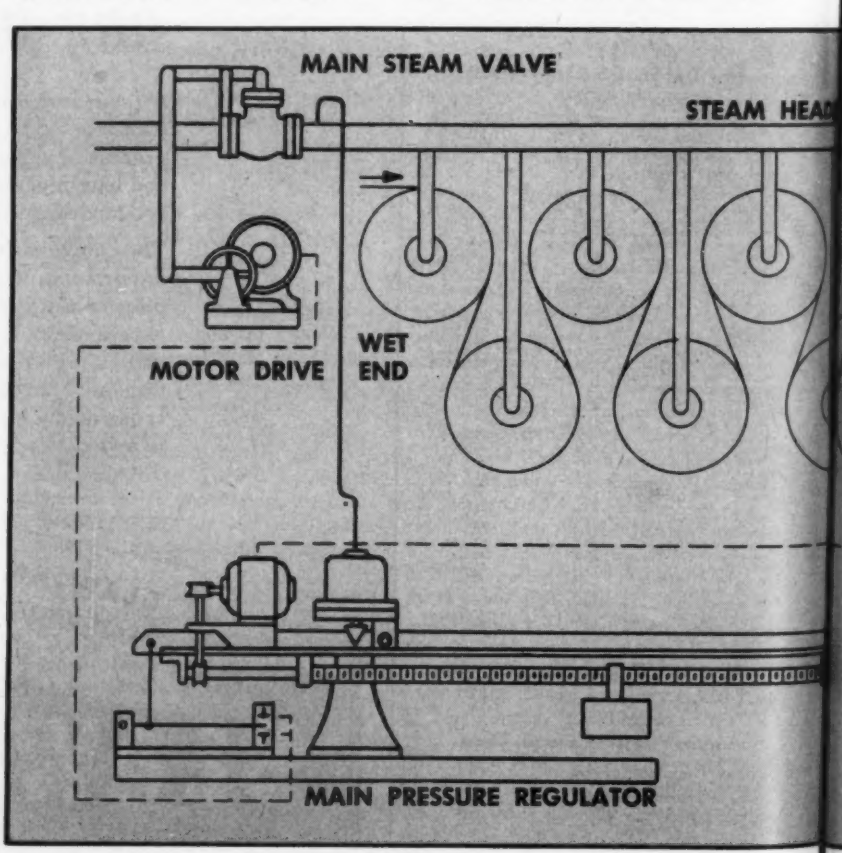


Figure 1—Schematic hookup of Armstrong Moisture Control on paper machine.

header. A very accurate pressure control valve, specially designed for the purpose, passes the steam into a trap-drained chamber ahead of the orifice plate to supply dry steam at a constant density to the orifice. A similar pressure control valve between the orifice and the indicating dryer insures constant temperature in the Armstrong-Trap-drained Indicating Dryer.

A manually-operated needle valve in a by-pass around the orifice gives control over the sensitivity of the Moisture Detector without changing orifice plates. This valve has an indicator wheel with graduated marks which are numbered, facilitating resetting to a predetermined degree of opening. Thus, the sensitivity of the moisture detector can be quickly set for different speeds of the paper machine.

Advantages

It is a pleasure to operate machines with an Armstrong Moisture Control because it corrects slight changes in sheet moisture content before such changes would even be noticed by the back tender. Management is pleased because there are fewer breaks, a higher moisture average, and no shipments refused due to unsatisfactory moisture content. And—the customer, who is the final boss, is pleased with the uniform quality of the paper.

For complete data and price, address:

Armstrong Machine Works

816 Hoffman St., Three Rivers, Michigan

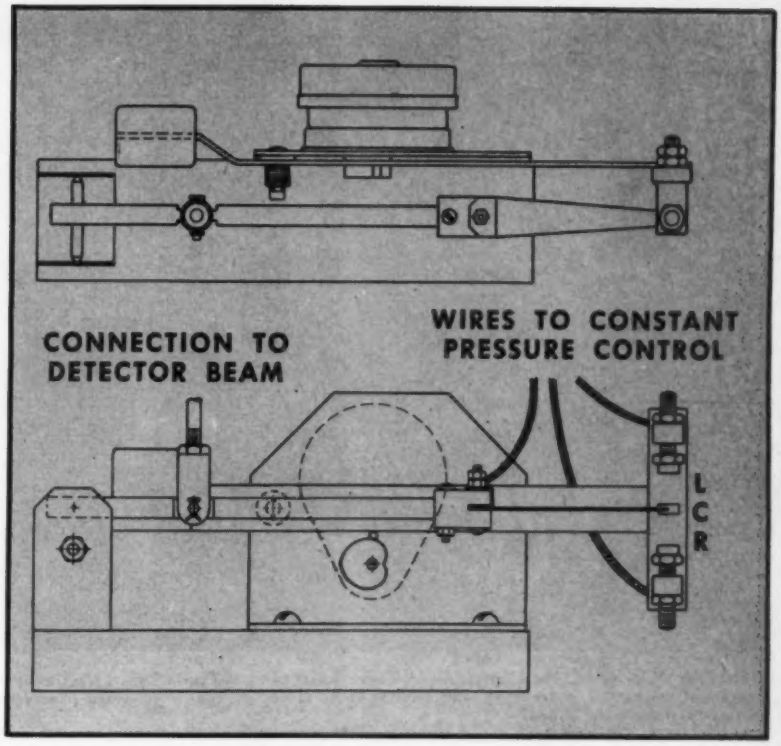
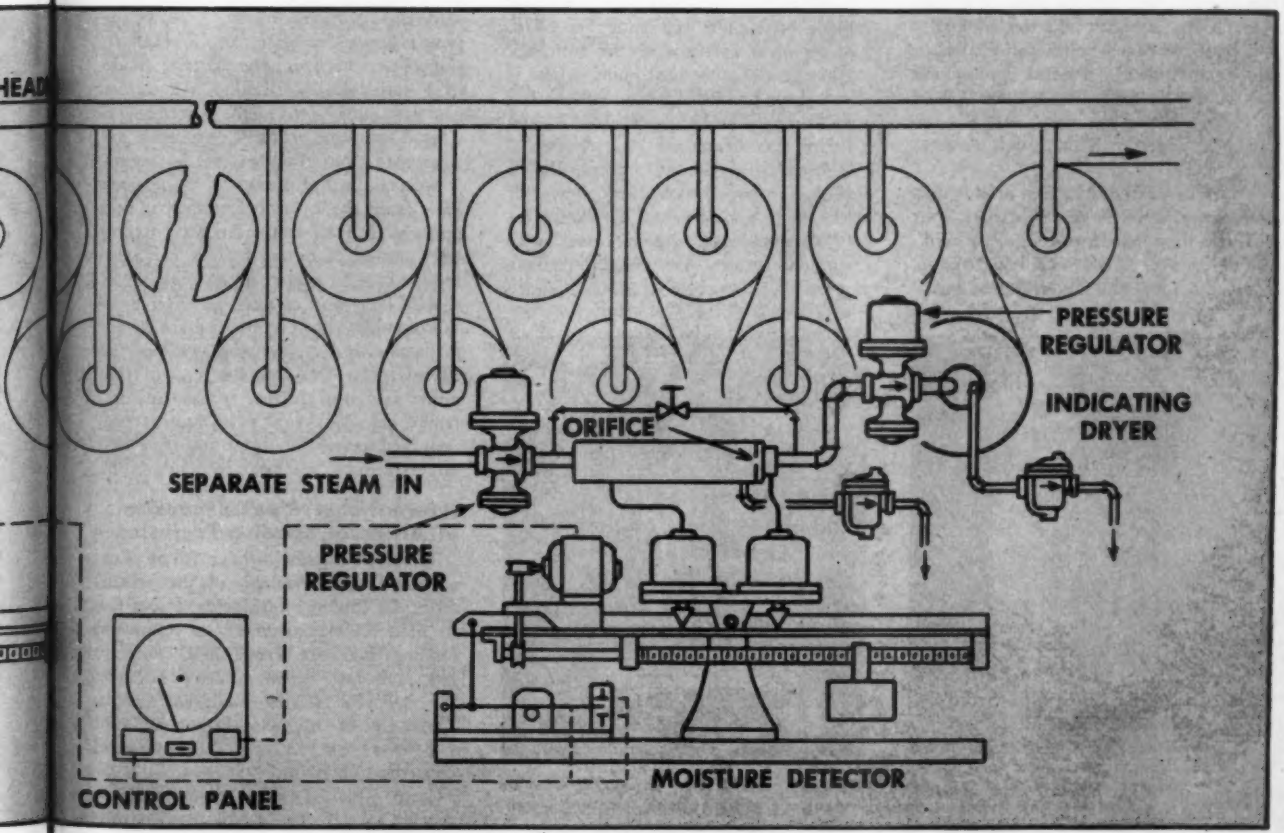
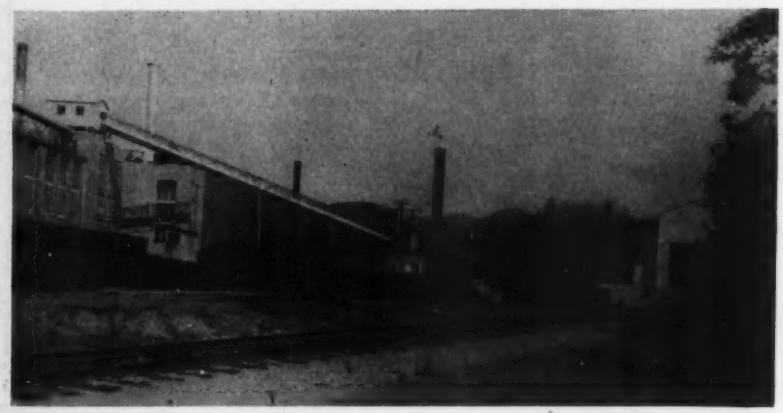


Figure 2—Detail of switch on Moisture Detector as described in paragraph headed "Moisture Detector Operation".



The Paper Industry News of the Industry



GENERAL VIEW of coal handling system at Pisgah Forest plant of Ecusta Paper; track hopper house and crusher pit at far right, with transfer house in center; coal is bulldozed from yard storage to reclaiming hopper

24-INCH BELT conveyor rises from crusher to transfer house; weightometer can be seen in background

Power Boost at Ecusta Paper

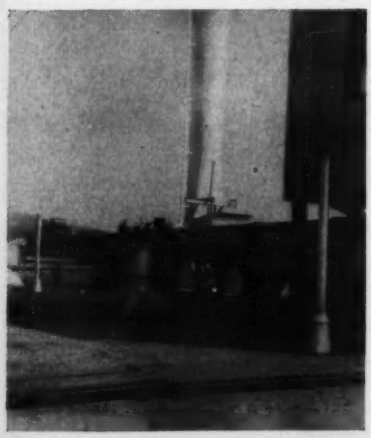
GROWING DEMANDS for power at the Pisgah Forest, N. C., plant of Ecusta Paper Corp. have necessitated the installation of expanded boiler and coal handling equipment. Typical production figures at the mill: 36,000,000 lb. of Olin cellophane per year and enough cigarette paper to make a billion cigarettes a day.

Three new pulverized coal fired boilers were installed with a 75-ton per hour coal handling system to keep their bunkers filled. A 50-ton per hour system feeds the four old stoker fed boilers—and two of the newer boilers if necessary.

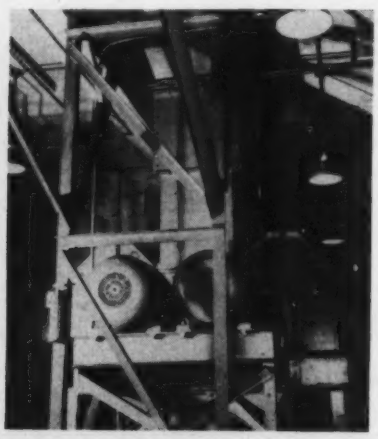
Coal enters the system from a track hopper on a new rail spur. A 24-in. pan conveyor carries the coal from the hopper to a crusher feed point, where it may bypass or feed direct to the crusher for sizing. The double rotor Knittel crusher manufactured by Stephens-Adamson Mfg. Co. of Aurora, Ill., is designed to prevent clogging on wet or sticky coal and crushes by means of two independently driven rotors with triangular sectors that split the coal on impact. The crusher is also designed for the automatic release of tramp iron.

Crushed coal passes to a belt conveyor running 201 ft. on a 16° slope to a transfer house, where it may be diverted to outside storage or carried on to the power house bunkers. Another 201-ft. slope belt runs from the transfer house to a horizontal distributing S-A Redler conveyor on the roof of the power house. This 17-in. unit runs 91 ft. with six side gate controlled discharge points. It receives coal at a rate of 75 tons per hour from the 24-in. belt conveyor that operates at 180 fpm. Another Redler unit serving the old boilers can also receive coal from the new system.

Belt conveyor carriers are S-A Sealmaster units that can be dismantled for inspection and maintenance without the use of tools. One-shot lubrication from either side adds further to easy maintenance. Holdbacks at head pulleys prevent belt reversal, and spring type belt wipers reduce belt wear to a minimum.



REDLER conveyor runs 91 ft. over roof with six slide gate discharge openings; 17-in. unit handles 75 tons per hour

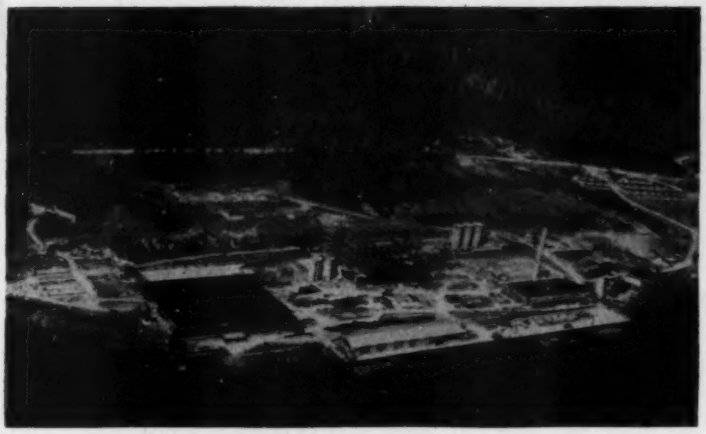


DOUBLE rotor Knittel crusher can handle wet or sticky coal without clogging; rotors are driven by independent motors

International Plans Expansion of Arkansas Loading Facilities

Increased interest in good forest management in the vicinity of Pine Bluff, Ark., has caused International Paper Co. to plan an expansion of its pulpwood loading facilities there. The company has purchased seven acres of land on the Missouri Pacific Railroad near a substation of Arkansas Power & Light Co. as a new loading and pulpwood concentration point.

Two older loading yards will be moved to the new location when con-



VIEW OF MILL site of Ketchikan Pulp Co. at Ward Cove, Alaska

SITE OF 80-ft. dam at Ward Cove

Ketchikan Pulp Project Reported On Schedule

Construction of the 300-ton dissolving pulp plant at Ward Cove near Ketchikan, Alaska, is on schedule, with some units ahead of the original schedule. The project is a joint venture of Puget Sound Pulp & Timber Co. of Bellingham, Wash., and American Viscose Corp. of Philadelphia.

The machine shop, storeroom, and pulp storage buildings are completed, as well as the dock, dock warehouses, and car ferry slip. Other structures are in various stages of construction. The 80-ft. dam and three miles of pipeline, which will provide process water in the amount of 50,000,000 gal. per day, are to be finished in September or October.

Machinery and equipment is arriving daily via car ferries from Prince Rupert and Puget Sound. Approximately 850 men are employed on the project. It is hoped that the plant can be completed by June of 1954.

Work in the forestry department has been active for the past year, including aerial surveys, timber studies, cruising of timber, lay-out of logging shows, etc. Initial logging operations were scheduled to start in July.

Construction work is being done by Ward Cove Builders.

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struction work is completed, according to George A. Lary, International representative at Pine Bluff. To speed up loading operations, Mr. Lary declared, a new crane pulpwood loader will be installed. It will be capable of picking up an entire truck load of pulpwood and transferring it to railroad cars in one operation. The necessary land has already been cleared, and the $20,000 crane was to be moved in as soon as crushed rock could be spread on the area.

Mr. Lary declared that the pulpwood operations in neighboring counties have been stepped up considerably in recent months as more farmers begin selective timber cutting. He said that International is now loading between 800 and 900 cords per week.

Charmin Completes Improvements

Major improvements to the sulfite plant of Charmin Paper Mills Inc. (formerly Hoberg Paper Mills) at Green Bay, Wis., were completed in July at a cost of approximately $50,000.

A Chemipulp spray cooler to cool gas entering the sulfur combustion chamber from 2000 to 155-175°F. is expected to eliminate sub-lime sulfur deposits that formerly had to be cleaned out of the Jensen cooler. As the gas enters the top of the 15-ft. high lead-lined chamber it will be sprayed with water. The system will further reduce two-thirds of the sulfuric acid produced by the gas.

To keep acid manufacturing at top level during the hot summer months, a Carrier refrigeration unit has been installed to cool the make-up water from 60 to 40°F.

St. Regis May Double Capacity at Jacksonville

Top officials of St. Regis Paper Co. have indicated that they are considering doubling the capacity of the firm's Jacksonville, Fla., paper mill. The information was released by Mayor Haydon Burns of Jacksonville.

Mayor Burns said that he had recently conferred with Roy K. Ferguson, St. Regis president and board chairman, and that company officials are "so pleased with the situation here that they have under consideration doubling the capacity of the mill."

The mill, officially opened last March 10, has a listed yearly capacity of 10,000 tons of kraft pulp, paper and board.

Esleeck Begins $40,000 Production Addition

Esleeck Mfg. Co. of Turners Falls, N.Y., has started construction of a $40,000 addition for expansion of storage and production areas. The announcement was made by F. Raymond Andrews, president.

The brick structure is to be 40 by 28 ft. and will be four stories in height. The addition will be a southerly extension of the machine room. It is expected that work will be completed in three months.

Knowlton Buys Lumber Mill

Knowlton Bros. Inc. of Watertown, N.Y., has purchased for $40,000 the former lumber mill and some of the property of W. A. Sullivan Lumber Co. Knowlton plans the installation of an elevator in the mill and will recondition it for the storage of paper manufacturing supplies and products.

Bowaters Southern Reports on Construction Progress

As of July 31, approximately 4,700 tons of steel had been erected at the new Calhoun, Tenn., mill of Bowaters Southern Paper Corp. The total steel

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PROGRESS AS OF July 31 on construction of Calhoun, Tenn., mill of Bowaters Southern Paper Corp.

requirement has been estimated to be more than 8,400 tons for the project, which was started in June of 1952. Operation is expected in the second quarter of next year.

During the last half of 1952 and the early months of 1953 more than 1,500,000 yds. of earth were moved in mill-site grading and the construction of settling basins and the log storage pond. In addition, some 7,000 piles were driven for building and equipment foundations.

The schedule for the entire project, as developed by J. E. Sirrine Co., consulting engineers, and Fraser Brace-Roane Anderson, general contractors, is geared to steel delivery and erection. So far as possible, underground pipe installation and other preliminary work was completed prior to the beginning of steel delivery in June of this year. The installation of equipment is closely scheduled behind the erection of steel.

In addition to the principal mill structures, work is well advanced on the facilities building, which will contain locker rooms, cafeteria, and other employee service facilities. In addition, construction of the filteration plant is proceeding on schedule. As of the end of July, the general contractors and the various sub-contractors crews on the job totaled 1,100 men.

Overall direction of the project is under the supervision of K. O. Elderkin, vice president and general manager of Bowaters Southern. The mill is designed to produce 130,000 tons of newsprint and 50,000 tons of semi-bleached sulfate pulp annually. The company expects to employ 750 people in its mill and administrative organization.

Hinde & Dauch-West Virginia Merger Recommended by Boards of Directors

A merger of West Virginia Pulp & Paper Co. and Hinde & Dauch Paper Co. was recently recommended by the boards of directors of both companies at separate meetings. The action is subject to stockholder approval.

On the basis proposed, shareholders of Hinde & Dauch will receive for each of their shares 1⅓ shares of new West Virginia common stock—after a four-for-one split of its present common. Hinde & Dauch is to be operated as a subsidiary of Westvaco, with the operations, personnel and customer relationships of the two firms continuing as they are at present.

West Virginia Pulp & Paper, one of the nation's best known producers of book and magazine paper and paper products used in the packing and food container fields, had net sales for the year ended October 31, 1952, of $108,933,000. Its net profit after taxes for the same period was $9,471,000.

Hinde & Dauch is a leading manufacturer of corrugated shipping containers and solid fiber boxes. It reported net sales last year of $43,118,000 and a net profit of $3,132,000. The company has 12 box factories that produce close to 3 billion sq. ft. of board products per year and three paperboard mills producing well over 80,000 tons annually.

In Canada, Hinde & Dauch owns a majority interest in Hinde & Dauch Paper Co. of Canada Ltd., which owns and operates two paperboard mills with an annual capacity of 100,000 tons and three box factories producing about 1 billion sq. ft. yearly. West Virginia recently purchased a partially integrated corrugated container plant in Brazil. In each case, the foreign subsidiary accounts for about 30 per cent of the output of its type of products in the country in which it operates.

12 plant sites

Hinde & Dauch maintains central offices in Sandusky, Ohio, which serves as the center for the operation of a chain of modern plants located in market areas throughout the East, the Great Lakes area, and the Midwest. In the new set-up Sandusky will continue to be the firm's headquarters.

Plant sites include box factories at Baltimore, Md.; Buffalo, N.Y.; Chicago; Cleveland; Detroit; Gloucester, N.J.; Hoboken, N.J.; Kansas City, Kans.; Richmond, Va.; Sandusky; St. Louis, and Watertown, Mass.; and paperboard mills at Gloucester; Fort Madison, Iowa, and Sandusky. These operations employ a total of 2,870 persons.

The Canadian subsidiary operates paperboard mills at Toronto and Trenton, Ont., and box factories at Toronto and Chatham, Ont., and Montreal. The Canadian organization employs 1,120 persons.

Six Westvaco mills

West Virginia Pulp & Paper has its main offices in New York, N.Y., and maintains sales offices in New York, Chicago, and San Francisco. New York is also headquarters for the firm's Industrial Chemical Sales Division, which markets a variety of chemical products through sales offices in New York, Philadelphia, Cleveland, and Chicago.

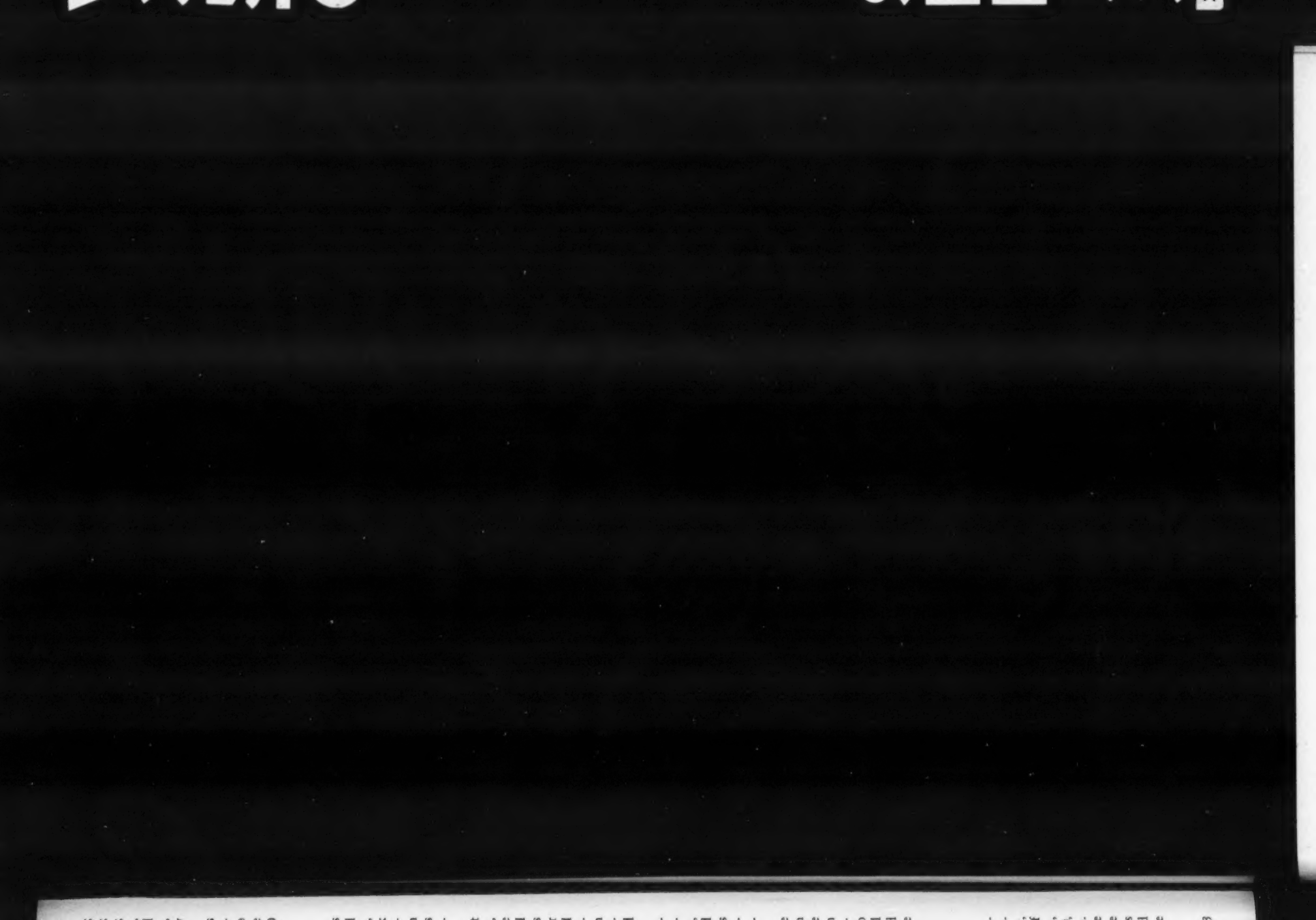
The company's plants—operated at Charleston, S.C.; Covington, Va.; Luke, Md.; Mechanicville, N.Y., and Tyrone and Williamsburg, Pa.—employ a total of 8,200 persons. Each of the plants has its own water system, steam and power plants and chemical operations, as well as pulp and paper manufacturing facilities. Westvaco has spent more than $92,000,000 on expansion and modernization projects since the end of World War II.

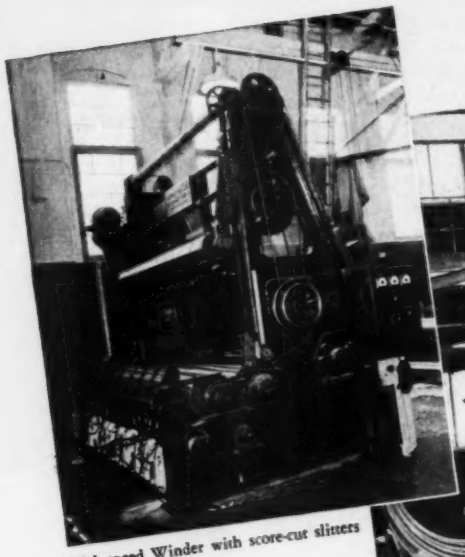
Three research and development laboratories, devoted to all phases of pulping, papermaking and chemical studies, are operated at Luke, Tyrone, and Charleston. The company also operates at Covington a modern pilot plant designed to produce all types of papermaking and dissolving pulp.

Westvaco owns and manages some 750,000 acres of timberland, mostly in North and South Carolina, which are operated in accordance with modern scientific tree farming methods to provide continuing yield and regrowth. Also maintained is a 20,000-acre experimental forest in South Carolina, where broad studies in modern forest techniques are carried out.

Crossett Announces $20 Million Mill in Arkansas

The management of Crossett Companies has announced plans for expanding its present facilities in Crossett, Ark., to include the production of bleached board. The new operation, which will cost a reported $20,000,000, will be equipped with a modern 194-in. trim cylinder machine and will produce approximately 150 tons daily. A mixture of bleached pine and hardwood pulps will be utilized to produce bleached board in various combinations for the packaging of food and related items.





High-speed Winder with score-cut slitters

High-speed Winder with shear-cut slitters

Modernize with a NEW Puseyjones Winder . . .

Puseyjones Winders, industry-wide, are keeping ahead of the requirements set by the fastest paper machines — producing top quality shipping and converting rolls of kraft, book, news, paperboard and tissue at speeds up to 6000 F.P.M.

Among the features incorporated in the Puseyjones Winder are:

(1) Separately driven winder drums

(2) Roll-weight relieving air cylinders

(3) Push-button controlled driven rider-roll lift

(4) Hydraulic-operated roll ejector and unloader

The latest type individual motor-driven shear-cut slitters or score-cut slitters are optional, depending upon mill preference.

The satisfactory performance of the Puseyjones Winder is evidenced by the fact that one mill now has six in operation.

Let us show you how a modern, high-speed Winder will step up production, increase profits. Write us today — we will have our District Representative call.

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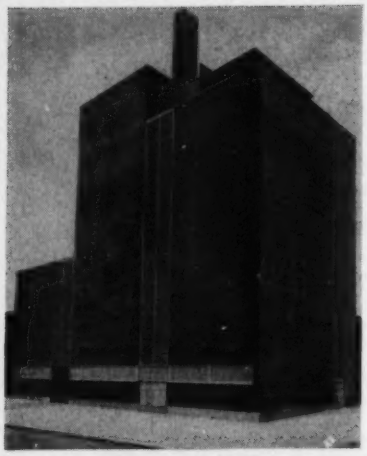
THE SIGN OF TRADE MARK SUPERIOR QUALITY



THREE CONTINUOUS VERTICAL banks of Burt wall louvers feature the new steam recovery building of Crossett Paper Mills, Crossett, Ark.; 13 ft. in width, the louvers were designed by the Rust Engineering Co. of Pittsburgh and fabricated by the Burt Mfg. Co., Akron, Ohio; they are in all-aluminum construction with aluminum blades

Plans for a cylinder machine will permit production of board containing varying blends of hardwood and pine to produce products designed to suit each customer's needs. Complete flexibility of furnish and specifications has been a fundamental goal in the planning.

Already in operation at Crossett is a kraft paper plant producing 450 tons daily. This mill uses only pine. The new plant will be equipped to use hardwood as well as pine by employing a neutral sulfite semichemical process. All preliminary research was conducted in the Crossett laboratories. Utilization of smaller size and lower grade hardwood timber, grown on the same tracts as pine, has long been an economic problem in the region.

Final engineering plans for the mill are now in preparation, and construction will require about two years from the date of contract award, P. F. Watzek, president of the combined companies, reported. Crossett Lumber Co. has as affiliates Crossett Lumber & Development Co. and Crossett Chemical Co.

Expansion Notes

The Ohio Boxboard Co.,
Rittman, Ohio, has purchased Valley Containers Inc. of Youngstown. Valley Containers, a former subsidiary of Ottawa River Paper Co., will be operated as a division of Ohio Boxboard and will be used to supply customers in the eastern Ohio area. Plans call for doubling the output of the plant by the addition of a second shift.

Hoosier Paper Corp.
is a recently organized firm that will produce box board paper in Vincennes, Ind. The company will take over the Vincennes property of Fort Wayne Corrugated Paper Co. Production is scheduled to begin as soon as the properties have been sufficiently improved.

American Can Co.
is installing a new fiber milk container manufacturing unit in its can-making plant at Stockton, Cal. It will have a rated capacity of up to 200,000,000 containers annually.

The Champion Paper & Fibre Co.
has purchased J. F. McAdams Pulpwood Co. of Cleveland, Texas. Mr. McAdams will become regional manager for the Champion subsidiary, which will be known as Texas Forest Farms Inc. All contracts and subcontracts will maintain their status under the new ownership. The McAdams company purchased pulpwood from about 200 farmers in neighboring counties. Texas Forest Farms expects to handle more than 30,000 cords per year, the wood being shipped to Champion's Pasadena mill.

Appleton Coated Paper Co.
of Appleton, Wis., has received a building permit for construction of a 50 by 100 ft. storage warehouse that will cost an estimated $23,000.

National Container Corp.
was to begin production of corrugated shipping boxes at its new Milwaukee plant August 17. The structure, built at a cost of $1,000,000, is owned by International Trading Co., a Milwaukee firm dealing in industrial properties and a National Container distributor. Within a year it is hoped that the plant will employ 150 workers on a three-shift basis.

Mando Combats Forest Fires Through Public Education

THE EXTREME IMPORTANCE of forest fire prevention and control, not only to those who make their living from green and growing forests but to the general public as well, is now being thoroughly recognized. What industry can do to further the public's appreciation of natural resources and the high price of wanton destruction is demonstrated in a public education program conducted by Minnesota & Ontario Paper Co.

Mando has long recognized that the first and foremost consideration in keeping forest land productive is protection against fire. Large capital investments in land and timber could not be risked without the security given by organized fire protection. Partial and selective cutting, the reservation for further growth of thrifty young stands, and the establishment of plantations could not be attempted on areas subject to indiscriminate burning.

MANDO TRUCK being loaded with fire fighting equipment; included are a power fire pump, 10-man fire tool boxes, hose and other miscellaneous equipment

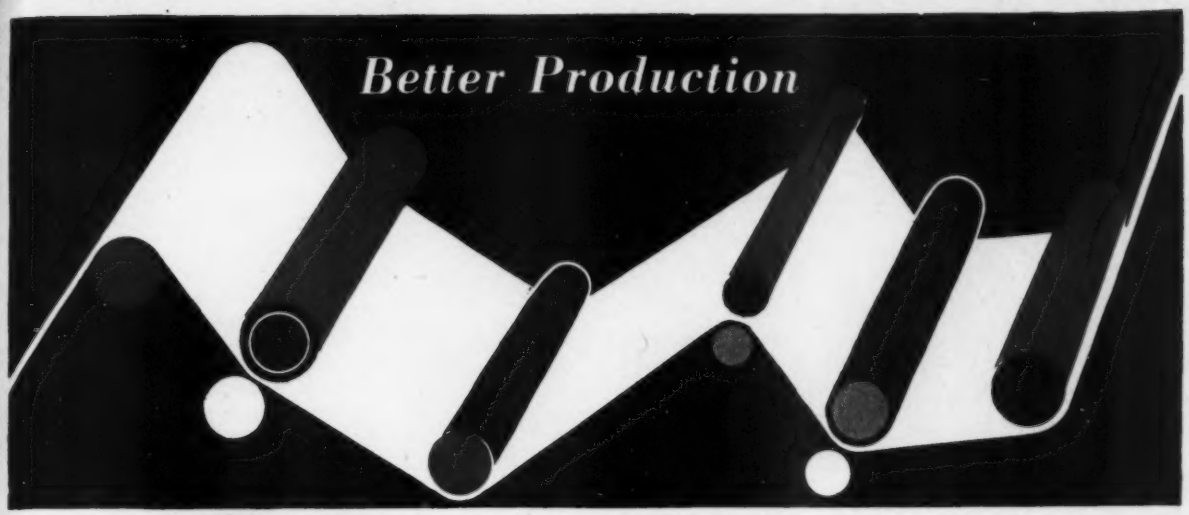
Of the several approaches to the problem of fire protection, Mando has found that the one that holds the greatest promise is public education. For this reason, personnel of the Forest Management Department are active in fire prevention campaigns. Company representatives serve at community, county, and state levels in such activities, which are spearheaded principally by the "Keep Minnesota Green" state and county committees.

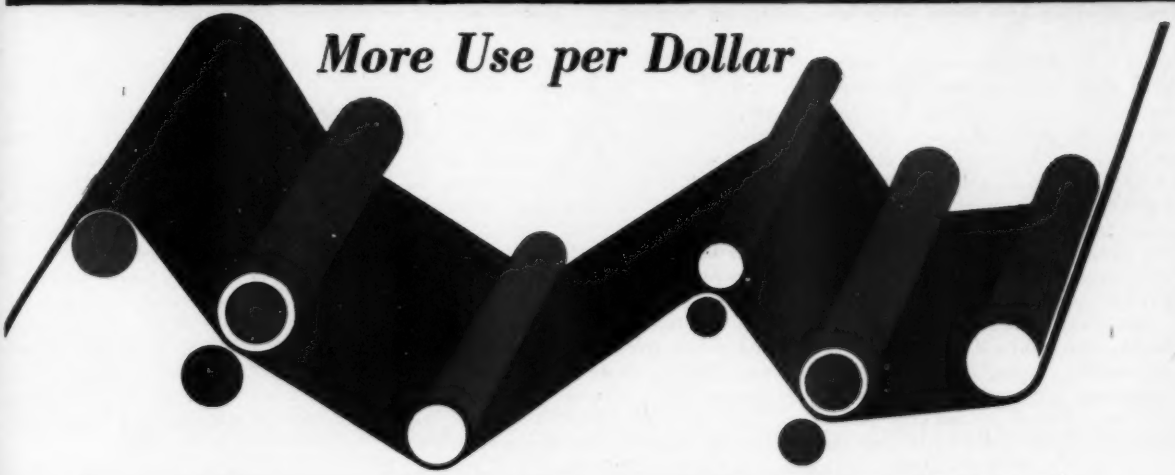
A look at the record

Fire records for a five-year period in Mando's Minnesota logging area show the effectiveness of such work. In 1947 some 83 acres were burned; in 1948, 320 acres; in 1949, 282 acres; in 1950, six acres, and in 1951, 139 acres. This is a total of 830 acres in the period within an area of 2,500,000 acres.

Within the company's area, fire protection and suppression work is primarily the responsibility of the state's division of forestry, which has a comprehensive fire detection and control organization within its ranger districts and supervisory areas. However, particularly during the highly hazardous seasons, the division is sometimes badly in need of help.

For this reason, Mando organized a cooperative fire fighting force that is prepared to give assistance on short





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• OUR NEW NEENAH, WIS. PLANT IS DESIGNED FROM THE GROUND UP TO HANDLE ANY SIZE ROLL COVERING MOST EFFICIENTLY.

You get better production with Manhattan rolls, because they maintain uniform density and perfect crown . . . because they don't oxidize, harden, corrugate or crack . . . and because there can be no separation of rubber from metal core. Yes, Manhattan Rubber Covered Rolls give you better production—and they do this long after you would have to replace other rolls. That's what we mean by MORE USE PER DOLLAR. A specialist from the R/M roll covering plant nearest you will cheerfully advise you or quote on your specifications. Call him next time.

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MR-912

TYPICAL TRUCK and some of the equipment it carries for fighting fires; shown are back pumps, walkie-talkie radios, and handtools

MIDDLE-BUSTER fire plow in operation; these plows cut fire lanes in almost any type terrain to help stop spread of bush fires

notice. Such assistance can be furnished from Forest Management supervisory headquarters at International Falls, from either of the district offices at Big Falls or Effie, or from any of the company contractor logging camps. In transmitting information on fires the short wave radio network has proved invaluable. The radio is also used on the fire line when necessary to coordinate fire suppression action.

Manpower available through the Mando organization is variable, depending on the season, and includes 23 supervisory personnel scattered through the area; 18 to 45 trained crew men at International Falls; five to 10 crew men at Big Falls, and from 140 to 625 woods workers in 28 company contractor camps.

Equipment for fire control is distributed to camps and district headquarters but may be concentrated as the need arises. Included are two fire trucks (for transporting water tanks, pumps, tools and men), three lowbed trailers, 13 company tractors and 45 contractor tractors, three middle-buster fire plows, two fire lane disc plows, seven panel and pickup trucks, seven power pumps, two 400-gal. water tanks, 140 back pumps, thirty 10-man fire tool boxes, 5,000 ft. of linen hose, 30 special brush cutting tools, two boats equipped with outboard motors and one boat trailer, and a large amount of miscellaneous equipment; the latter includes pump and hose fittings, axes and saws, pails and flame guns. The availability of the company's heavy tractor and plow equipment, together with skilled and experienced operators, is of invaluable help in the fire suppression work.

Equipment manufacturers supplying the bulk of Mando's fire fighting facilities include Pacific Marine Supplier Co., Seattle; D. B. Smith, Utica, N.Y.; Fairbanks Morse Co., Chicago; Watson Jack & Co. Ltd., Montreal; Panama Pump Co., Hattiesburg, Mo., and Porto Pump Inc., Detroit.

1952 Lake States Pulpwood Cut Second Highest on Record

The 1952 cut of pulpwood in Minnesota, Wisconsin and Michigan was the second highest on record, according to a survey recently completed by the Lake States Forest Experiment Station at St. Paul. A summary of reports from pulp mills drawing wood from the region shows that they received approximately 2,280,000 cords. This is down 12 per cent from the all-time high of 2,577,000 cords, produced in 1951.

Of the 1952 total, Minnesota produced about 41 per cent, Michigan 33 per cent, and Wisconsin 26 per cent. Despite the rise and fall of pulpwood production during the past six or seven years, each state has produced about the same proportion of the regional total each year.

Spruce was the leading species, accounting for nearly ⅓ of the wood received by the Lake States mills. However, spruce was exceeded by aspen in wood cut in the region, more than half of the spruce used by the mills having been imported from Canada.

With the exception of spruce and balsam fir, the production of all species showed a decrease from the previous year. Of the principal species, pine and hemlock had the greatest decline.

Total imports from Canada and the western states were about the same as in 1951. Canadian spruce shipments increased slightly, but those of most other species were down. Shipments of lodgepole pine from the western states showed a sizable increase, contrasting sharply with the decline in western spruce shipments.

National Forest Receipts Total $76.5 Million

Approximately $76,500,000 in national forest receipts was deposited in the federal treasury between July 1, 1952, and June 30, 1953, by the U.S. Forest Service. The money was acquired from the sale of timber and the leasing of land for grazing, power, recreation, and other special uses. These deposits are $5,000,000 greater than the sum deposited from the 152 national forests for the previous fiscal year.

The greatest source of revenue from the national forests is timber, which in the year accounted for about $71,000,000. Approximately $4,500,000 was collected as fees for grazing cattle, sheep, horses, and goats. Another $1,000,000 was collected from other land leases, including summer home sites, resorts, water power and mineral rights.

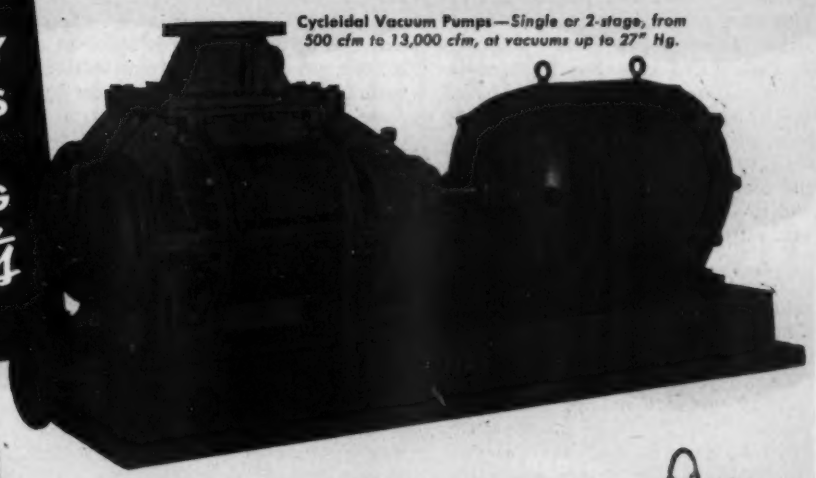
O-M Establishes Experimental Forest in Ontario

Highlighting the company's participation in National Forest Conservation Week, J. F. MacKellar, vice president and general manager of The Ontario-Minnesota Pulp & Paper Co. Ltd., announced the establishment of an experimental forest on the highway between Fort Frances and Kenora, Ont.

Covering an area of 3,000 acres, the forest will be a source of new insight into better ways to harvest and perpetuate the forest areas of the province. Thus far, 212 sample plots have been set up, Mr. MacKellar declared. The main reason for establishing the forest, he added, is to experiment with different cutting methods and costs and to determine the relative success in obtaining natural regeneration after the harvest.

The study of woods problems in ex-

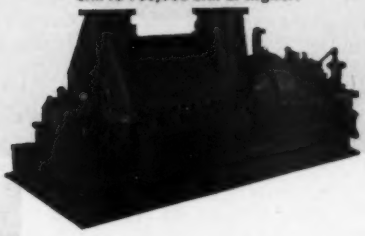
HIGH-EFFICIENCY VACUUM PUMPS BUILT BY AIR HANDLING *Specialists*

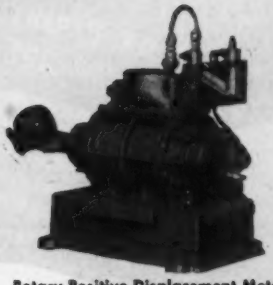


Cycloidal Vacuum Pumps—*Single or 2-stage, from 500 cfm to 13,000 cfm, at vacuums up to 27" Hg.*

Inert Gas Generators
Portable or stationary, from 1,000 cfh to 35,000 cfh.

Centrifugal Blowers and Exhausters
Single and multi-stage, from 2,000 cfm to 100,000 cfm or higher.





Rotary Positive Displacement Meters
4,000 cfh to 1,000,000 cfh.

Rotary Positive Gas Pumps
5 cfm to 50,000 cfm.

Rotary Positive Blowers and Exhausters
5 cfm to 50,000 cfm.

The wide acceptance of R-C Vacuum Pumps is the result of extremely low cost for power and water, and proved long-time reliability of these simple rotary positive units. Further, because they operate at higher speeds (600 rpm and above), they require smaller motors, less floor space and lower foundation cost. This naturally reduces initial investment and thus increases the percentage of operation savings.

The successful performance of R-C Vacuum Pumps comes from almost a century of experience in handling air and gas. That is our exclusive business — we are "specialists" in that job. We are also the only builders of the *dual-ability* line of Centrifugal and Rotary Positive Blowers, Exhauster and Gas Pumps. Because of this, we can offer you the unbiased, *dual choice* of units that are best fitted to your requirements. And, the wide range of capacities of R-C equipment eliminates oversizing, thus reducing first cost and lowering operating expense.

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perimental forests is a regular part of Minnesota & Ontario Paper Co.'s long-range forest management program, which is aimed at putting lands under its jurisdiction on a sustained yield basis. (Ontario-Minnesota is a Mando affiliate.)

In 1952, on an experimental basis, the company planted 35,000 seedlings, and so far this year 17,000 trees have been set out on the operating area.

Hoberg Name Change Announced

The name of Hoberg Paper Mills Inc., Green Bay, Wis., has been officially changed to Charmin Paper Mills Inc., according to a recent announcement by J. M. Conway, president and general manager. The change was made "in order to more closely identify the company with the Charmin and Evergreen lines of paper products manufactured by the company," Mr. Conway declared. He said there would be no change in either the products or the policies of the firm.

The original John Hoberg Co. was founded in 1892 at Kaukauna. Mill equipment consisted of a 72-in. water-powered paper machine and two converting machines. In 1895 the firm moved to Green Bay at the urgings of the Green Bay Business Men's Association. Today the company's Division A properties are located on the original site along the north bank of the East River.

There were 35 persons on the 1895 payroll. At present, Charmin employs more than 1,000 at its three plants—Division A, which has converting facilities for all Charmin and Evergreen products plus five paper machines; Division B, which includes the sulfite mill, laboratory, and two paper machines, and Little Rapids, south of West DePere, which was purchased to assure the firm a constant source of groundwood used in manufacture.

Recent improvements at Charmin include a new powerhouse and paper machine at Division A and stream barking facilities at Division B. The firm is currently in the process of constructing a $2,500,000 torula yeast plant.

Japanese Give O. K. to Alaska Pulp Mill

Twenty-two Japanese promoters have approved a plan to build a lumber and pulp mill at Sitka, Alaska, capable of producing 3,000,000 cu. ft. of lumber annually. They have formed an investment company to establish an American corporation to be known as Sitka Lumber & Pulp Mill.

It was thought that the Japanese firm would be functioning sometime in August. The mill will be producing 100,000 tons of pulp per year in four years, according to present plans. Capitalization of the company is about $4,167,000, of which 80 per cent will be financed by Japanese, the remainder by Americans.

Marathon Converts to Oil to Combat Air Pollution

Marathon Corp. is converting three of its four steam plant boilers at Menasha, Wis., to heavy fuel oil operation in an effort to eliminate air pollution caused by smoke, soot, and fly ash. The project is scheduled for completion next month.

First step in the conversion project was the installation of three underground storage tanks, each with a capacity of 30,000 gal. Anticipated cold weather-consumption is expected to be about 12,000 gal. daily. The tanks, each weighing 10 tons, are bedded in sand and anchored to concrete piers beneath the seepage level of a canal adjacent to the plant. The decision to use fuel oil followed successful trial runs with one oil burner last winter.

Brazil Plans Three Mills in Amazon Area

Plans for the establishment of three giant paper and pulp mills in Brazil's heavily forested Amazon area, with possible participation by foreign private capital, have been announced in New York, N.Y., by Licurgo Costa, director of the Brazilian Government Trade Bureau.

It was disclosed that the mills, as blueprinted by Brazil's Ministry of Agriculture and its Northern Agricultural Institute, would each be geared for an output of upwards of 1,000 tons of wood pulp daily. Total yearly production would come to nearly 1,000,000 tons.

Technical research on Amazon timber and mill processes leading up to the planning stage was carried out in France and in the United States during the past six months. The processes to be used would make possible production of suitable pulp from selected tropical timbers little used for the purpose heretofore.

Mr. Costa reported that the establishment of the factories on the planned production level would save his country approximately $5,000,000 yearly now spent on pulp imports and would eventually cut sharply into the $30,000,000 Brazil spends annually on newsprint imports—mostly from the United States and Canada.

500,000 square miles

Brazil's forest reserves in the Amazon area cover more than half a million square miles. Hundreds of rivers and streams in the region will make it easy to transport the logs by floating.

The millsites would be the Island of Marajo at the mouth of the Amazon; a point at the mouth of the Madeira, an Amazon tributary, and near Manaus, 1,000 miles upstream on the Amazon.

Brazil already has several paper and pulp mills, although production is far below national requirements. Largest are the Klabin mills in the State of Parana, which produce upwards of 60,000 tons yearly and represent one of the biggest investments in a single industry in the country.

Germ-Deadening Paper Toweling Developed by Armed Forces

One of the new developments recently brought to perfection by the Armed Forces Medical Procurement Agency is paper toweling that deadens germs.

Rolls of the creped paper are 18 in. in width. They are so designed that they can be fixed to one end of a hospital examining table and spread the length of the table; the toweling is wound fresh for each patient. The development is aimed specifically at reducing the high danger of infection at battlefield first aid stations.

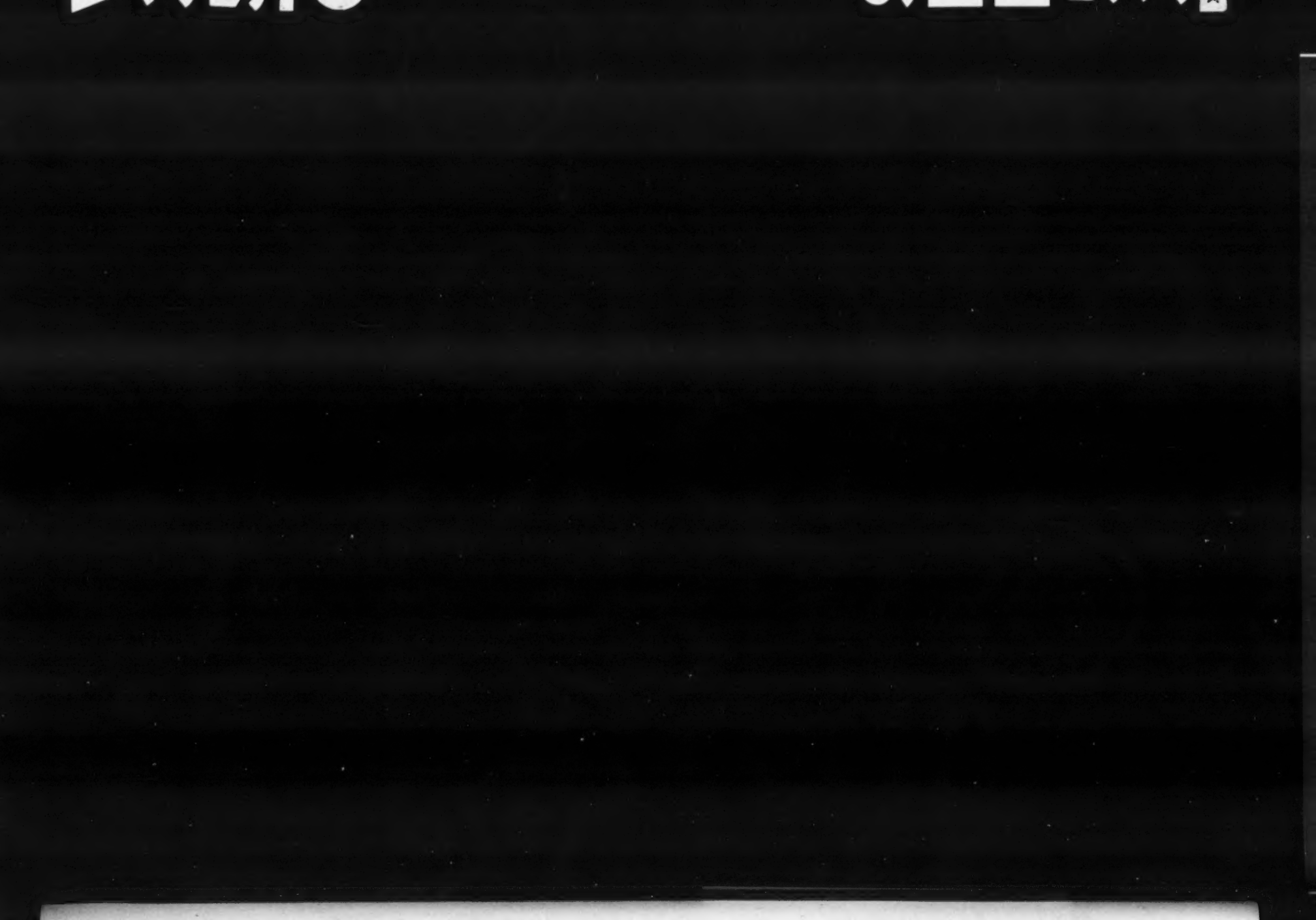
The current specifications of this paper is headed, "Paper, Sheeting, Bactericidal." It is made in 50-yd. rolls 18 in. in width "having bacteriestatic and fungistatic properties. The paper shall also be suitable as a wrapping for instruments during sterilization in an autoclave."

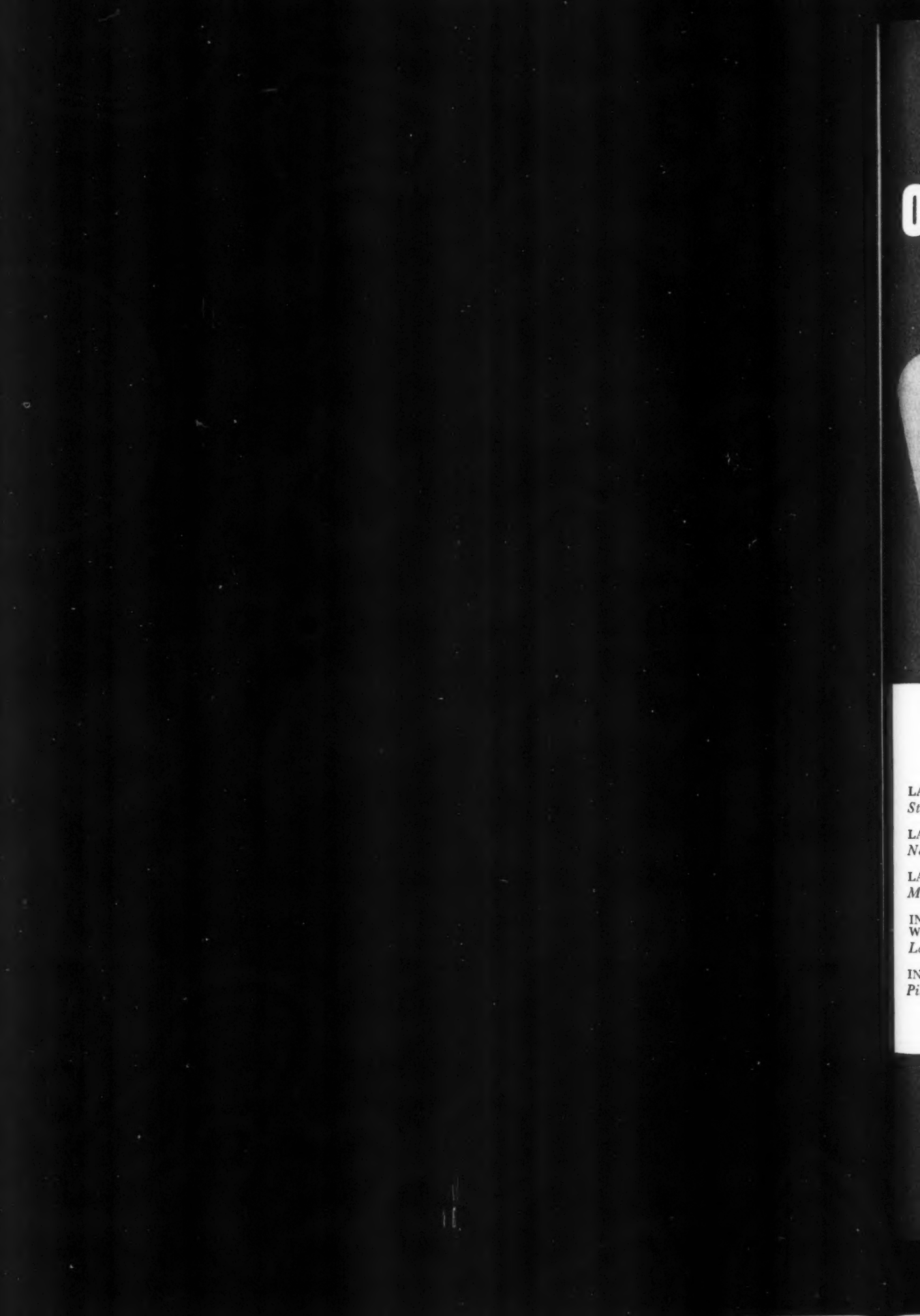
The requirements for the paper are for treatment with a quaternary ammonium chloride or an equivalent chemical compound for bacteriostatic and fungistatic properties, highly absorbent, 42 lb. basis weight and otherwise resembling a good paper toweling. Tests for determining the bacteriostatic and fungistatic properties are exacting, calling for physical proof by test cultures of *Micrococcus aureus* in a nutrient broth. Incubation tests of 24 to 48 hours are required in this procedure for evidence of inhibitation of bacterial growth.

For household use

The formula and technique have now been adapted to ordinary paper toweling for household and industrial use. These products are being marketed by at least one firm, Pennsylvania General Paper Corp. under its Hygeia brand.

While this is the first appearance of bacteriostatic toweling, its is not the first commercial appearance in paper





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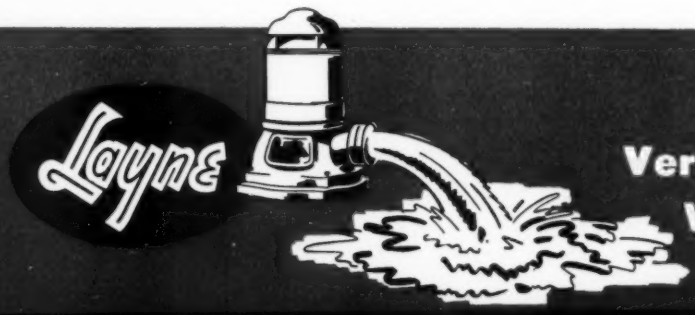

Water Wells
Vertical Turbine Pumps
Water Treatment

INTERIOR OF BOX CAR showing end wall after being sprayed with protective coating; wooden framework erected and Kimsul blanket insulation being applied

PLASTIC-FACED plywood sheets are fastened to car ceiling with screws as final application; work was done by C & NW mechanical engineers

New Type Box Car Protects Wet Wood Pulp in Winter Transit

AN INSULATED BOX CAR designed to protect wet wood pulp from freezing during winter months while in transit between plants of Kimberly-Clark Corp. in Wisconsin has been developed by car experts of the Chicago & North Western Ry.

The development is the result of studies and tests conducted by the railroad during the past two years to find an economical replacement for a number of its refrigerator cars that were being used in this specialized movement and were soon due for normal retirement.

While work on the project started in 1951, it was not until this past February that tests with a specially insulated car proved satisfactory. One such test in February in which the car was under wet pulp load for six days showed no freezing of contents even when outside temperatures dropped to zero.

Insulating procedure

Twelve cars, including the test car, have been remodeled from 40-ft. underframe composite box cars, which, after application of insulation, have an interior capacity of 2,576 cu. ft., a 193-cu. ft. increase over each refrigerator car replaced. The method of insulating the cars was designed by G. R. Andersen, assistant chief mechanical engineer for the Chicago & North Western. The insulating procedure is as follows:

1. Inside walls, ends and ceiling are first given a protective and insulating coating of a cement similar to car undercoatings.

2. The original car floor is covered with two layers of sisal kraft paper on which is applied a ⅞-in. thick wood flooring.

3. A wooden frame is erected on the sides, ends and roof to provide support and depth for the insulating material.

4. Kimsul blanket insulation is fitted into framework spacings on the sides, ends and roof. A similar wooden framework with insulation is installed on a "plug" type door.

5. The entire insulated area is covered with two layers of sisal kraft paper, over which is applied GPX plastic-faced plywood having high abrasion and moisture resistance.

Working closely with Mr. Andersen on the project were P. E. Feucht, president of the railroad; J. E. Goodwin, vice president in charge of operations, and W. L. Thornton Jr., general traffic manager for Kimberly-Clark at Neenah. The cars were remodeled in the Winona, Minn., shops of the railroad.

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for consumer use. Recently there was introduced to the public Yes tissues by the Personal Products Division of Johnson & Johnson.

Fungistatic properties

The quaternary compound used in these paper products is in itself a fairly recent development. It is a powerful sanitizer that is becoming widely used wherever food, utensils and cooking ware are cleaned. The U.S. Navy and other branches of government, as well as many restaurants and industrial establishments, are among the agencies that have adopted it in their operations.

The fungistatic properties of the paper have not been exploited commercially. Not only will the quaternary deaden bacteria, it will also prevent the growth of any fungus. This makes it a most important item in the protection of food.

Another feature of the bacteriostatic paper is its ability to discourage dust settling on areas to which the paper has been applied. Since the quaternary has cationic properties, it tends to repel dust particles. A similar product is being marketed solely for these properties.

A virtue of the quaternary compound of great importance to papermaking is its tendency to reduce embrittlement. After treatment, the paper is softer to the touch and maintains this property longer.

Application

The methods of application of the germicidal compound to paper are still a matter of experimental research requiring actual tests under operating conditions.

One chemical firm has suggested that the quaternary be stored in 55-gal. drums with a nipple on the bottom so that the solution can be fed into a centrifugal pump. A conventional strainer is placed in the line, and a relatively coarse brass screen used with a needle valve for flow control is suggested for uniformity of flow.

Application is recommended after the press section and before the baby dryer. A shower head or pipe ½ to ¾ in. in diameter should be used.

The quaternary compound was prepared in a solution adjusted to the operating speed of the machine, the width of the web and the weight of the paper. The formula is adjusted to yield paper with the concentration required. Other recommended procedures include application at either headbox or beater.

Gardner Board & Carton Institutes Health Program

The first step in the establishment of a long-range industrial medical program has been announced by The Gardner Board & Carton Co. of Middletown, Ohio. Dr. Rodman Wilson of Cincinnati has accepted a temporary appointment as director of medical services.

Dr. Wilson will supervise present company medical services and help set up the long-range program. A graduate of Princeton University, he received his M.D. degree from Johns Hopkins University. Before joining the Gardner staff, he was a resident physician at Cincinnati General Hospital.

Maine Foundation Given $1,000 by International Paper Co.

International Paper Co. has made a special gift of $1,000 to the University of Maine Pulp & Paper Foundation, it was announced recently by T. G. Mangan, chairman of the membership committee.

Mr. Mangan, who is manager for International at Livermore Falls, also announced that two more firms have taken memberships in the Foundation. They are E. D. Jones & Sons Co. of Pittsfield, Mass., and Union Bag & Paper Corp. of New York, N.Y.

Customs Court Cases

Importers have acceded to the decision of the United States Customs Court on the dutiable value of wrapping paper imported from Finland, in which the court held that the paper was undervalued by the failure to include in the dutiable value Finnish inland freight from the mill to the port of export. A long series of cases at Philadelphia—106 in number—involving both sulfite and kraft paper was included in the decision, under which the importers are forced to pay higher duty rate than they had contemplated.

In a further report on customs cases, Warren B. Bullock, manager of the Import Committee of the American Paper Industry, has reported that the U.S. Customs Court, reviewing a decision on the dutiable value of Canadian converter rolls of toilet paper imported at Seattle, held that the brand known as "Westminster" is dutiable at $6.11 per case, not at $5.24; also, that the "Purex" brand is dutiale at $8.33-⅓ per case, not at $7.17.

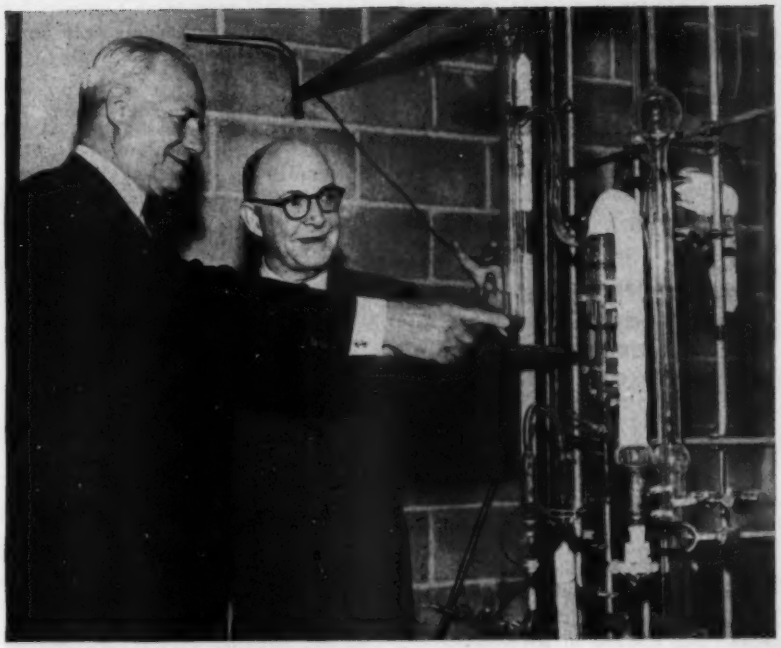
Anglo-Canadian to Buy Dryden Paper Co.

Arrangements for the sale of the majority of the outstanding common stock of Dryden Paper Co. Ltd. to Anglo-Canadian Pulp & Paper Mills have been completed. The announcement came from J. R. S. McLernon, a Dryden director.

Mr. McLernon, said to be acting as spokesman for a group of stockholders owning the majority of Dryden's stock, said Anglo-Canadian has agreed to pay $35 in cash and one share of its own common stock in exchange for each Dryden share. The payment is to be made on or before November 15.

Under terms of the agreement, Anglo-Canadian will offer to purchase at the same price the holdings of all other Dryden stockholders living in Canada. Stockholders in foreign countries will be notified accordingly, Mr. McLernon declared.

On July 31 Dryden had 205,000 no-par shares outstanding of the 300,000 authorized. Anglo-Canadian had 1,050,000 no-par shares outstanding of the authorized 1,500,000.



RESEARCH EQUIPMENT at the University of Washington is inspected by Henry Schmitz, school president, and Dr. Arthur N. Parrett, vice president in charge of research and development for Rayonier Inc.; Dr. Parrett visited the campus to present $3,500 to the university for the establishment of graduate and undergraduate fellowships and scholarships for Rayonier and the Rayonier Foundation; the firm is also establishing a $1,000 scholarship at the University of Florida and a $2,500 fellowship at Georgia School of Technology

Consolidated Water P & P and Canadian Company Form New Wisconsin Firm

Consolidated Water Power & Paper Co. of Wisconsin Rapids, Wis., and Arborite Co. Ltd. of Montreal have entered an agreement for the formation of a new firm for the manufacture of plastic surfacing material. The new company, to be known as Consoweld Inc., will construct a plant in Wisconsin Rapids or Biron, Wis., in the near future.

Articles of incorporation will be filed and officers of the new company elected at a later date, when organizational details are completed. Pending construction of the new plant, Consolidated will service the combined distributing systems, adding wallboard material made by Arborite to its present lines. Manufacturing operations during the interim period will continue in the plastics department of Consolidated's Ahdawagam Division.

In connection with the change in operations, Consolidated has named Jay G. Somers, director of quality control, to assistant manager in charge of plastics; John A. Davies, formerly exclusive United States sales representative for Arborite, to assistant sales manager, and J. S. Chiswell, fabricating department foreman, to assistant superintendent in charge of plastics operations.

Howard Smith subsidiary

Arborite, a subsidiary of Howard Smith Paper Mills Ltd., is a leading manufacturer of plastic surfacing in Canada and has been marketing 1/10-in. plastic designed for wallboard application through distributors in the U.S.

Consolidated first entered the plastics field in 1941, developing an exceptionally strong material using paper from a special pulp manufactured at one of its mills. During World War II, production was devoted exclusively to various aircraft materials. In 1946 the company

began producing Consoweld decorative laminates and industrial laminates. Arborite has been manufacturing its plastic product since 1947.

While plant sites are available in both Wisconsin Rapids and Biron, on land presently owned by Consolidated, a final decision as to the plant's location is dependent on obtaining suitable clearance from municipal officials.

10,000,000th Pound of Torula Yeast Shipped by Rhinelander

The 10,000,000th pound of torula yeast produced from spent sulfite liquor was shipped by Lake States Yeast Corp. in late July. Lake States is a wholly owned subsidiary of Rhinelander Paper Co., Rhinelander, Wis.

Coincidentally with the announcement that the 10,000,000-lb. figure had been reached, the Wisconsin Committee on Water Pollution publicly announced that Rhinelander Paper's anti-pollution work "has resulted in a big improvement in (Wisconsin) river water conditions below the mill for many miles."

The Lake States plant is the only commercial unit of its kind in North America, although a similar plant is being constructed in Green Bay for Charmin Paper Mills Inc. (formerly Hoberg Paper Mills). This plant is scheduled to go into operation in late 1954.

In less than three and a half years of operation, the Rhinelander yeast plant has propagated torula yeast organisms in 150,000,000 gal. of liquor from the sulfite pulp mill. The yeast organisms have consumed 20,000,000 lb. of wood sugars from the solution and thus have kept this quantity of sugar from entering the stream.

For three years the plant discarded the resultant desugared wood solids extract. Since last November, however, a new evaporator plant has been boiling out most of the water (see THE PAPER INDUSTRY for December 1952, page 1074). The concentrated extract is sold to other industries as raw material or is burned in place of coal in the mill boilers.

Charmin Anti-Pollution Project Progress

Final space requirements for the yeast plant being built in Green Bay, Wis., by Charmin Paper Mills Inc. have been resolved, and engineers are preparing plans and specifications for a two-story building 165 ft. long by 82 ft. wide by 40 ft. high. (Charmin was formerly Hoberg Paper Mills.)

The structure is to be erected on the company's Division B property and when completed will be the world's largest torula yeast plant. Contracts for major equipment, including yeast separators, dryers and blenders, are to be awarded soon.

Meanwhile, work on the 3,150-ft. tunnel that will bring steam from the Division A boiler plant to operate the yeast plant is progressing ahead of schedule. Chapel & Amundson, Green Bay contractors, are in charge of this phase of the anti-pollution project. Contracts were recently awarded to Zeise Construction Co., also of Green Bay, to build access houses over the tunnel. Another local firm, The Reliable Painting Service, is painting all exposed steel within the tunnel.

PROVING ground for sulfite road-binder

Proving Ground for Sulfite Roadbinder Built in Wisconsin

A plot of land near Appleton, Wis., has been converted into a road proving ground, the Sulphite Pulp Manufacturers' Research League announced recently. On this proving ground League engineers and scientists with laboratory instruments make periodic tests to discover how sulfite roadbinder is most effective in creating low-cost, dustless, stabilized surfaces on unpaved roads and streets.

"Our research men selected for the proving ground a particular piece of land on a bluff overlooking the Fox River between Appleton and Kimberly because its silty soil is exactly like the surface of many Wisconsin country roads," declared Groff Collett, League business manager. "The technical men split up the area into experimental strips for testing various combinations of roadbinder concentration and surface treatment. The test strips are surrounded by a control section, which is left untreated for comparison."

Tests are currently being made with roadbinder ranging from 14 to 52 per cent solids content. Various quantities of roadbinder are applied, so that the sulfite solids in the surface soils vary from 0.5 to 4 per cent. On some test strips roadbinder was merely allowed to soak in after spreading; while on others the binder was well mixed into the soil for a depth of several inches with a rotary garden tiller.

"Research goals set up by League technical men for the proving ground include finding out more about the effect of roadbinder on soil density, bearing capacity, moisture content, moisture penetration, and surface durability," Mr. Collett concluded. Also under test are various methods of application, ranging from mere soaking to blending through rotary mixing.

Nepco Tests New Pulping Process in Pollution Battle

Using a process never before tested on a mill scale, Nekoosa-Edwards Paper Co. of Port Edwards, Wis., has completed a series of experiments on a pulping method that it is hoped will reduce stream pollution from sulfite mills.

The process uses ordinary lye in place of the usual limestone. This method, known as soda-base cooking, can be employed only if the costly chemical can be recovered for reuse. Engineers from Western Precipitation Corp. in Los Angeles, which owns a recovery process for the soda, are working closely with Nepco's technical and operating staff. The process has been reported to be technically feasible but until now has not undergone critical mill-scale evaluation.

Thus far, Nekoosa-Edwards has manufactured about 500 tons of sulfite pulp by this soda-base process. Limited success has been attained in processing the resultant liquor so that it can be burned with recovery of heat and chemicals. Since none of the processed liquor is discarded, this method, if successful, would be highly effective in reducing stream pollution.

Company executives report that the experiments are encouraging but by no means conclusive. It is hoped that more tests will disclose how to reduce the cost of the process to such a point that its use will be economical. Two mills in Europe—where economic conditions are greatly different from those in Wisconsin—are using the method; it is reported that they have been successful in recovering the valuable sodium.

Charmin Paper Mills and Yeast Firm Sign Agreement

Red Star Yeast & Products Co. of Milwaukee and Charmin Paper Mills (formerly Hoberg Paper Mills) of Green Bay have completed an agreement whereby volume production of torula yeast

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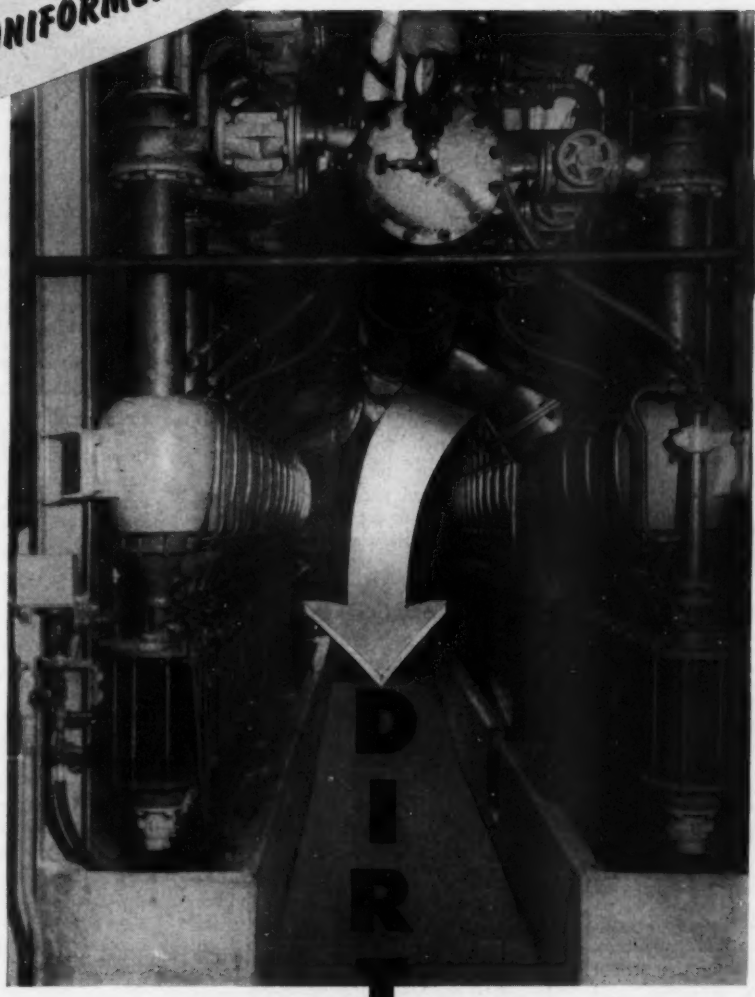

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and greatly expanded facilities for its sale and distribution are virtually assured. The agreement also calls for research to determine torula's full potential as an ingredient in human foods, animal feed, and as a basic material for pharmaceuticals.

The agreement makes the venture unique in the yeast business. Details were announced by Russell D. L. Wirth, president of Red Star, and J. M. Conway, president of Charmin.

Charmin now has under construction a new torula yeast plant adjacent to its Green Bay paper mills. The plant will provide the American market with its first major source of the yeast in dependable continuing supply. It will have an annual capacity of at least 10,000,000 lb.

Meanwhile, the extensive research facilities of Red Star will be devoted to seeking additional new uses and a full line of products. The firm has pioneered many advances in yeast technology, yeast products, and yeast quality control.

Unlike the more familiar active yeasts used in baking and brewing, torula yeast is not a leavening agent but is an inactive yeast of purely nutritional value. It differs from other yeasts, also, in that it is made in a continuous propagation process that is revolutionary to the yeast industry. It has a characteristically pleasant taste and does not require de-bittering.

Southern Firms Give Wholehearted Support to North Carolina Project

Eleven of the South's major pulp and paper mills have thrown their support behind the newly developed training and research program in pulp and paper technology in the School of Forestry at North Carolina State College.

Announcement of the industrial interest in the training work was made by Dean Richard J. Preston of the School of Forestry and Prof. C. E. Libby, head of the curriculum in pulp and paper technology. (Dr. Libby was formerly head of the pulp and paper curriculum at the New York State College of Forestry, Syracuse.)

The 11 firms that have pledged their support, together with representative executives, are as follows: Hollingsworth & Whitney Co., Mobile, Ala., James L. Madden; Riegel Paper Corp., Acme, N.C., John L. Riegel; Continental Can Co., Hopewell, Va., Hans A. Eggerss; The Champion Paper & Fibre Co., Canton, Reuben B. Robertson; Halifax Paper Co., Roanoke Rapids, F. D. Gottwald; Camp Mfg. Co., Franklin, Va., Hugh D. Camp; The Mead Corp., Sylva, N.C.; Brunswick Pulp & Paper Co., Brunswick, Ga., E. J. Gayner III; Gaylord Container Corp., Bogalusa, La., Vertrees Young; Buckeye Cotton Oil Co., Memphis, Tenn., William F. Bowld, and Union Bag & Paper Corp., Savannah, Ga., G. W. E. Nicholson.

Dean Preston declared that the industrial representatives have provided the college officials with technical guidance in setting up the new curriculum and have agreed to continue their advisory services to the school.

$200,000 laboratory

Following the appropriation of $200,000 for a pulp and paper laboratory by the 1953 state general assembly, officials of the School of Forestry at State College are now working on plans for the laboratory and are pushing other efforts to advance the training and teaching program in pulp and paper. The plan has received the approval of the Southern Regional Education Board, which views the pulp and paper work as a key factor toward further industrial progress in the South.

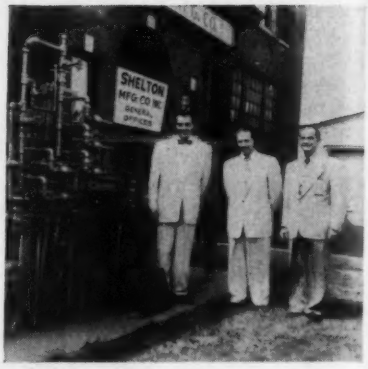
Professor Libby in a recent comment on his work at North Carolina State declared that the South is faced with "a terrific shortage" of qualified personnel for its pulp and paper mills, and that the principal purpose of the new program is to train the men needed by these mills.

July Newsprint Statistics

Production in Canada (including Newfoundland) during July amounted to 491,254 tons and shipments to 494,212 tons. Output in the United States was 88,121 tons, and shipments were 90,755 tons, making a total North American production of 579,375 tons and shipments of 584,967 tons. This compares with continental production of 579,731 tons and shipments of 578,183 tons in July of 1952. North American production in July of 1953 was the second highest on record for this month and was but 0.1 per cent below the 1952 all-time July peak. These figures were released by the Newsprint Service Bureau, New York, N. Y.

The Canadian mills produced 2,641 tons more in the first seven months of 1953 than in the corresponding period of 1952, which was an increase of 0.1 per cent. The output in the United States was 55,048 tons, or 8.1 per cent, below that of the first seven months of last year, thus the net continental decrease under production in the comparable 1952 period amounted to 52,407 tons, or 1.3 per cent.

Stocks of newsprint paper at the end of July were 169,702 tons at Canadian mills and 7,577 tons at U. S. mills, making a combined total of 177,279 tons, compared with 182,871 tons on June 30, 1953, and 152,921 tons at the end of July 1952.



COMMEMORATING 34 years of operation, officials of Shelton Mfg. Co. of Newark, N. J., stand beside the single-faced corrugated board combining machine that launched the firm in 1919; the machine followed several Shelton expansion moves and was put out of operation 28 years ago; it now stands as a monument; the executives are (l to r): Sam Katcher, secretary-treasurer; A. I. Nierenberg, president, and Otto A. Grossman, comptroller, only 34-year veteran of the organization

Industry Notes

Crown Zellerbach Corp.
has announced the formation of a market research department and the appointment of Marion H. Marks as manager. Mr. Marks, who has been with the firm 30 years, was formerly manager of the economic research department, which activities will be included under the new, expanded setup. Mr. Marks is a member of C-Z's retirement plan committee.

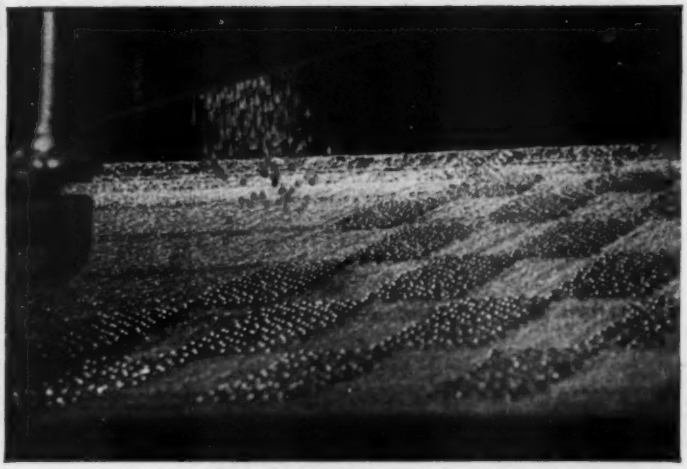
American Paper Tube Co.
is closing its plant at Greenville, S.C., and will relocate its southern operations at Port Gibson, Miss. Edmond H. Guerin, president, said that the firm will temporarily consolidate all operations at its Woonsocket, R.I., plant until the Port Gibson plant—now under construction—is completed. The company makes yarn carriers for the textile industry.

Rayonier Inc.
has filed claims for $1,130,295 damages in a Seattle court against the United States Forest Service. The company is seeking compensation for damages suffered to timber holdings in a 1951 forest fire that swept through Forks, a town on the Olympic Peninsula. Rayonier maintains that the government agency was negligent in fighting the blaze.

Paper Corp. of America,
Cheboygan, Mich., has filed a voluntary petition for reorganization under the bankruptcy statutes.

Stebbins Celebrates 50 Years

Stebbins Engineering & Mfg. Co. of Watertown, N.Y., celebrated its 50th



Just one phase of Swift's exclusive process—the glue liquor falls on a bed of dry finished product and moves through a virtually closed drying system. No chance for contact with contaminating substances.

Attention paper producers!

Only Swift can give you New Process Glue

A product of unexcelled purity and uniformity, New Process Glue is *exclusive* with Swift. Only Swift has the facilities to manufacture this quality glue for paper makers.

In Swift's exclusive process, protein liquor is scientifically extracted from fresh, selected raw material. The concentrated liquor falls in drops on a moving belt of dry glue. Then, by continuous and automatic process, the product is dried, milled and screened. During the entire manufacturing process and in finished form, the product must pass rigid laboratory tests . . . meet a number of chemical and physical requirements.

Uncontaminated by foreign substances—New Process Glue is a clean, light-colored, uniform product.

Here's where Swift's New Process Glue serves the paper producer

● ***IN PIGMENT RETENTION*** — The flocculating action of New Process Glue promotes high retention of clay and titanium pigments . . . keeps fiber and filler on the wire of the paper machine . . . helps increase the brightness and opacity of filled papers . . . promotes better fiber formation, aiding in the production of a denser, stronger sheet.

● ***IN FLOTATION-TYPE SAVEALL SYSTEMS*** — New Process Glue helps obtain clearer effluents because of its unusual ability to flock fibers and fillers.

● ***IN GETTING HIGHER PICK TEST*** — New Process Glue is used as a partial replacement for starch in machine coating. It promotes better film formation and greater tensile strength than a total starch solution.

SWIFT & COMPANY
Adhesive Products Department
Chicago 9, Illinois

Please send your 100-lb. introductory shipment of Swift's New Process Glue at the quantity price, to be tested for use in our operations. We understand, if not fully satisfactory, it may be returned for credit at your expense.

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APPLETON, WISCONSIN

corporate anniversary in August. The firm has specialized in the design, installation, maintenance and repair of corrosion-resistant linings and process vessels.

A leader in the development and application of new lining materials and techniques to satisfy the changing cooking, bleaching and storage problems of the pulp and paper industry, Stebbins began with the installation of ceramic linings in digesters and acid towers in the sulfite industry.

Green Bay Plating Firm Bows

Paper mill executives visited the new plant of Ultra Plating Corp. in Green Bay, Wis., when it made its bow in the business world in August. The firm uses a new method of chrome plating that is claimed to be of great value to paper mills because of its wearing qualities when applied to rolls and wires.

The plating method used was developed during World War II by Dr. Hans Hausner, a German scientist. It involves the use of ultra-high frequency electric current superimposed on the conventional direct current used for plating. The result is that the chrome coating is driven into the grain of the metal and is so precise that the coating will carry the finish of the original material.

The new Green Bay firm is directed by a group headed by E. W. Forkin and now has 12 employees.

Allied Notes

Pacific Coast Supply Co.,
originally incorporated in 1919 as a wholly owned subsidiary of Crown Willamette Paper Co., will terminate its function as a sales agency for pulp and paper mill supplies and equipment on December 31.

Oliver United Filters Inc.
has announced the acquisition for manufacture, sales and service of all rights in connection with the Centriclone from the former owner, Equipment Engineers Inc. of San Francisco. The Centriclone is a combination of the conventional liquid cyclone and the centrifuge.

Allied Chemical & Dye Corp.'s
Barrett Division has announced that its new $5,000,000 phthalic anhydride plant near Chicago is in full operation.

Hanchett Mfg. Co.
has broken ground in Portland, Ore., for a building that will house factory, warehouse, and sales and service offices. Increased manufacturing facilities are part of the expansion program.

Poole Foundry & Machine Co.
of Baltimore has announced the appointment of Kramer Industrial Sales Co., Milwaukee, as its representative in Wisconsin and eastern Iowa.

BUILDING RECENTLY ACQUIRED by Samuel M. Langston Co. in Camden, N.J.; the parts department is already located in the structure; about 85 per cent of the machine tools of the firm will be moved to the new location in a few months; during this time, a number of replacement as well as additional machine tools will be installed

American Cyanamid Co.'s
Calco Chemical Division will build a $14,000,000 titanium dioxide plant on the outskirts of Savannah, Ga. Completion is expected by 1955.

E. I. duPont de Nemours & Co.
has announced that the first tank car of hydrogen peroxide manufactured by a new non-electrolytic process has been shipped from the firm's Memphis plant. The unit is the first hydrogen peroxide plant to be built in the South.

Chain Belt Co.,
Milwaukee, has acquired Shafer Bearing Co. of Downers Grove, Ill. The Shafer line of industrial roller bearings will supplement Chain Belt's chains and sprockets for power transmission and conveying.

General American Transportation Corp.
has acquired additional property adjacent to its tank storage terminal in Carteret, N.J.

Allied Personalities

J. H. MATTHEWS has been appointed executive vice president of Raybestos-Manhattan Inc. He began his career with Manhattan Rubber Mfg. Co. in 1914.

JOHN C. CLAY, assistant administrator of the National Production Authority, has completed his duties with that agency and is returning to private industry. He has been on leave for 14 months as assistant to the executive vice president of National Starch Products Inc.

GEORGE B. MARTIN, associated with papermaking for his entire business life, has been made a sales representative for F. C. Huyck & Sons, Rensselaer, N.Y. He will serve a majority of the mills in New York State.

G. B. Martin

E. J. Cook

ELLSWORTH J. COOK, previously technical director of Paper Corp. of America at Cheboygan, Mich., has joined Kelco Co.'s paper technical department at Chicago.

Ohio Injector Co. of Wadsworth has announced two promotions. *HARRY C. BELL* becomes manager of engineering sales. And *PAUL E. WARNER*, formerly sales manager of the Atlantic Division, becomes manager of sales promotion.

Appleton Woolen Mills has announced the retirement of *JACK E. JOHNSON* of Oswego, Ore., as West

Coast representative. *C. W. FELT* of Seattle is his successor. Mr. Johnson was associated with Appleton on the West Coast for 12 years.

PAUL A. COFFMAN has been elected vice president of Omega Machine Co., a division of Builders Iron Foundry, Providence, R.I. He joined the firm in 1934.

P. A. Coffman

E. A. Snyder

A. H. Borchardt

W. D. Donohue

EMMETT A. SNYDER of Vincennes, Ind., has been named a sales representative by Draper Bros. Co. He was for several years a representative of Rice-Barton Corp. in the Midwest.

WALTER F. SENKUS has been made Midwest sales representative for De Laval Steam Turbine Co., Trenton, N.J.

H. H. ZOLLAR has been made general manager of Shenango-Penn Mold Co.'s Centrifugal Casting Division, Dover, Ohio. He was formerly manager of sales.

ALBERT H. BORCHARDT has retired as vice president of Worthington Corp. after 44 years' service. He became vice president in 1951. Mr. Borchardt is a long-time member of Tappi.

WILLIAM D. DONOHUE has been made sales manager of Paper Machinery & Research Inc., Roselle, N.J.

The appointment of *IRVING H. PETERS* as manager of field service engineering has been announced by Frederic A. Soderberg, vice president of F. C. Huyck & Sons, Rensselaer, N.Y. He has been associated with Dill & Collins Inc. and Flambeau Paper Co.

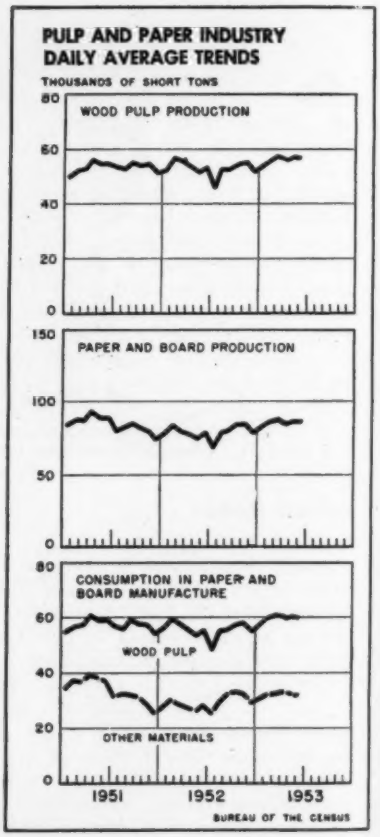
U. S. Paper and Paperboard Production

	June 1953 (tons)	May 1953 (tons)	June 1952 (tons)	Total 1952* (1,000 tons)	Total 1947 (1,000 tons)
Paper and Board, total	2,261,873	2,262,764	1,949,028	24,413	21,102
Paper, total	941,221	962,803	866,549	10,896	10,693
Newsprint	89,306	90,107	93,546	1,106	833
Groundwood paper (uncoated)	62,969	67,127	63,069	809	821
Printing and converting (coated)	94,859	96,968	91,620	1,096	
Book paper (uncoated)	140,387	138,775	123,431	1,482	2,208
Fine paper (writing, cover and text, bristols, thin paper and other)	108,542	112,343	100,121	1,295	1,172
Coarse paper (unbleached, kraft, glassine, greaseproof, vegetable parchment and other)	278,951	292,593	250,159	3,235	2,903
Special industrial paper	37,979	33,881	35,082	396	289
Sanitary tissue stock	99,158	100,123	84,348	1,148	894
Tissue paper	19,721	18,814	15,988	209	195
Absorbent paper	9,349	12,072	9,185	118	100
Paperboard, total	1,056,420	1,038,132	846,294	10,776	9,187
Containerboard, total	579,092	571,087	452,363	5,770	4,943
Liners	389,507	379,676	303,987	3,905	3,293
Corrugating material	157,468	161,057	123,735	1,583	1,370
Container chipboard	32,117	30,354	24,641	282	280
Bending board (folding boxboard)	300,624	294,241	249,420	2,194	2,249
Non-bending board (set-up boxboard)	80,833	74,595	57,915	687	595
Special paperboard stock	82,579	85,205	80,681	2,056	1,307
Cardboard	13,292	13,004	5,915	69	92
Wet machine board	14,092	13,671	11,770	137	150
Construction paper and board, total	250,140	248,158	224,415	2,603	2,349
Construction paper	125,251	122,158	114,266	1,298	1,277
Hardboard and insulating board	124,889	126,000	110,149	1,305	1,072

(*) Preliminary report. *Source: U.S. Department of Commerce.*

June Pulp, Paper and Board Production

Paper and board production during June amounted to 2,261,873 tons, according to a report recently released by the Bureau of the Census. This is an approximate 16 per cent increase over the tonnage of 1,949,028 produced in June a year ago. The output of paperboard grades during the month, amounting to 1,056,420 tons, reflected an increase of 25 per cent over the production of June of 1952. Paper production, amounting to 941,221 tons, registered an 8 per cent increase from the 866,549 tons produced in the same month a year ago.



Pulpwood receipts at the pulp mills during June amounted to 2,258,511 cords, with consumption at 2,369,716 cords. Month-end inventories decreased about 2 per cent to 4,948,206 cords.

Wood pulp production during June amounted to 1,477,347 tons, as compared to 1,330,762 tons produced in June a year ago.

Wood pulp inventories at the end of June at the paper and board mills amounted to 541,814 tons, showing a slight growth during the month. Month-end stocks at the pulp mills were 172,463 tons, virtually unchanged from the 173,387 tons reported at the end of May.

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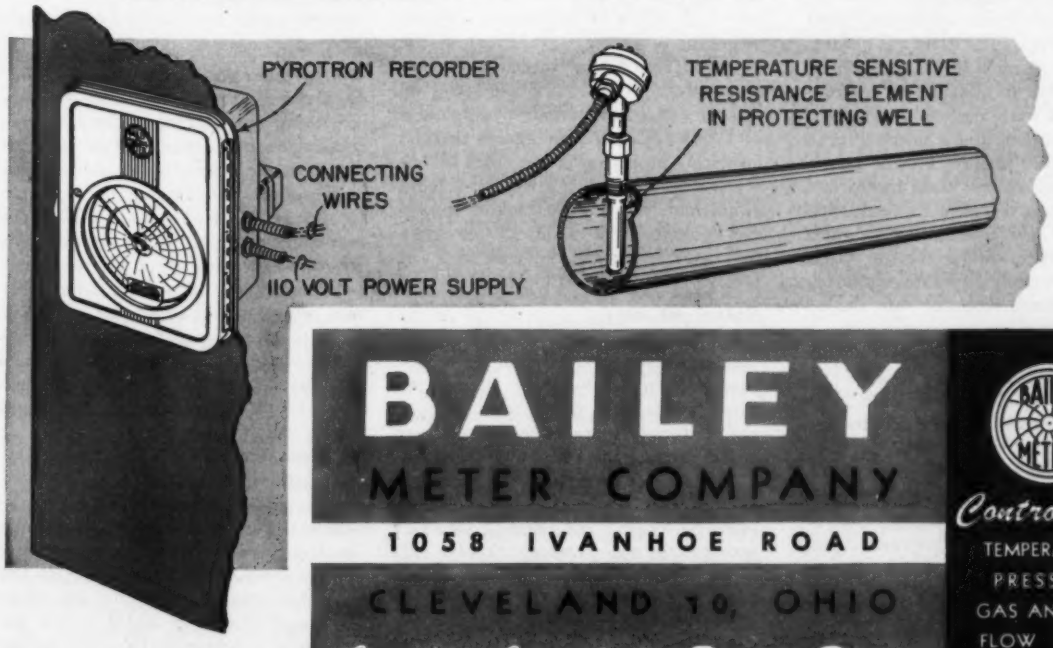

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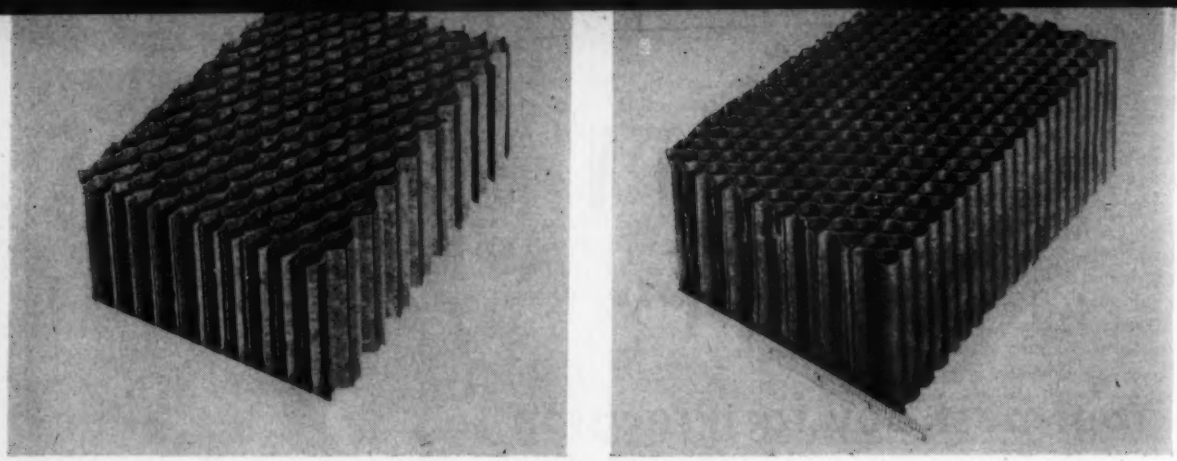


Fig. 1—Left, expanded type of paper honeycomb core; right, figure 8-type of honeycomb core

Thermal insulation of paper honeycomb cores and sound absorption of sandwich panels

D. J. FAHEY
M. E. DUNLAP
R. J. SEIDL
Forest Products Laboratory*
U. S. Department of Agriculture

PAPER HONEYCOMB assemblies in one form or another are becoming more and more important as core materials in sandwich-type building panels. Light, strong, and stiff panels can be produced by bonding facings of plywood, hardboard, aluminum, or other sheet material to such lightweight core materials.

Research work on sandwich construction has been carried on at the Forest Products Laboratory for over 10 years.

It was apparent early in the work on paper honeycomb cores that, if they were to be used in panels where any great degree of thermal insulation was needed, it would be desirable to fill the cells of the honeycomb. In 1944 a few exploratory attempts were made to fill the cells of the honeycomb, and a phenolic resin was successfully foamed into the honeycomb structures. Cores were forced into blocks of balsa wood with little difficulty. These few experiments indicated the possibility of filling the air spaces of the honeycomb structure when improved insulation properties are needed.

To use sandwich construction in buildings erected in cold northern climates it appears to be necessary to fill the cells to obtain insulation properties equivalent to those of conventional insulated construction. In some cases increasing the thickness of the core material between the facings may be the most economical way of improving insulation properties; in other cases it may not be practical.

When sandwich construction was first considered for building material in partitions and doors, its ability to absorb or transmit sound was often questioned. Most of these panels would have very little inherent sound-absorbing properties because of the hard-surfaced facings and the low mass of the panels. These properties might be improved, however, by means of perforations in one of the exposed faces or by special core constructions.

This report summarizes investigations of (1) ways of improving the thermal insulating properties of the cores by filling the openings with low-density foam or fill materials and (2) sound absorption properties of sandwich construction as affected by the core and the facings.

Honeycomb core

Paper can be converted to honeycomb core in a number of different ways. The expanded type is made by interspacing sheets of treated paper with parallel and uniformly spaced strips of adhesive and expanding the assembly, after bonding, to form a core with hexagonal cell sections (Fig. 1, left). Another type is made by looping and bonding sheets of resin-treated paper to form circular cells representing a "figure 8" in cross section (Fig. 1, right). From assemblies of sheets of corrugated paper, a number of different core constructions are also possible, some easier than others to fabricate. Eight of such constructions are shown in Fig. 2. Most of the experiments reported herein were made with corrugated core.

A kraft paper weighing 20, 30, or 50 pounds per 3,000 sq. ft. was treated with 15 per cent of a water-soluble phenolic resin (based on the total weight of resin and fiber). The paper was corrugated on A-flute corrugating rolls (approximately three flutes per inch) and assembled into blocks with a phenolic adhesive. In some cases a flat sheet of treated paper was inserted between the corrugated sheets.

Filling the cells of the honeycomb

There are a number of different ways of filling the opening of the cells, including foaming resin into the cells, filling cells with finely granulated insulating material, or forcing the core into blocks of low-density material. In these experiments three phenolic foaming-type resins were tried, using procedures recommended by the manufacturer except for slight modifications for producing the foamed-in-place resin. All three were liquid resins and, with the addition of a catalyst and in one case heat, they could be foamed into the honeycomb cells.

Resin A required no heat to produce the foaming action. Aerating the liquid resin with a high-speed mechanical stirrer for about 1 minute alone tended to increase the volume by about 10 to 20 per cent. About 5 per cent of an acid-catalyst solution based on the weight of liquid resin was added to the resin and mixed thoroughly for a few seconds. The mixture was rapidly poured into a

*Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

shallow container, and the core was immediately placed in the layer of resin and held there, with no external heat required, until the foaming was completed. The foam was sufficiently set after a few minutes to permit removal of the core from the form (Fig. 3). Since a large amount of heat was generated, it was necessary to allow for rapid removal of the gas that evolved during the reaction. The foamed resin was spongelike in structure and pink in color when produced, but it darkened slightly in time.

The walls of the honeycomb cells offered a resistance to the foaming action of the resin. If the resin was foamed into a large block with no core to obstruct the foaming action, a foam with a density of 0.3 pound per cubic foot or less was obtained, but the lowest-density foam produced in a corrugated-type honeycomb structure was about 1 pound per cubic foot. The density of the foamed resin in a "figure-8" type of core with loops about 1¼ in. in diameter was about one-third that in a corrugated honeycomb structure with cells about ¼ inch in diameter. Warming the honeycomb core before foaming the resin into the cells facilitated the rate of the reaction and resulted in lower-density foams.

The foaming procedure for the second phenolic resin, resin B, was about the same as that for resin A, except that this resin required the addition of two ingredients before the activator. When the activator was added, the original brown resin color changed to green. This change was an indicator of the approximate time in which the foaming action would occur.

The third foaming resin, resin C, required a temperature of 350° F. to produce the foaming action. About 6 per cent of a powdered catalyst was mixed with the resin, the mixture was poured into a shallow container, and the core was held firmly down on the resin. Both the container and the core were placed in a circulating oven for 15 minutes, which was the approximate time required to complete the reaction.

In the few preliminary experiments on the three resins, resin A produced the lowest-density foam for a given core construction. All three foams had low water absorption. In addition to improvement of thermal insulation, an improvement in the fire resistance of the panel can be realized with foamed-in-place resins. The combustibility of a panel should also be lessened. Depending on the density of the foam, an improvement in compressive strength of the core has also been obtained.

In large-scale production of resin-filled core it may be possible to spot droplets of catalyzed resin on a rapidly moving corrugated web that is in the process of being assembled into core, or to deposit droplets of catalyzed resin into cells of the assembled core, so that with proper timing the foam would fill the cells and provide the inherent benefits.

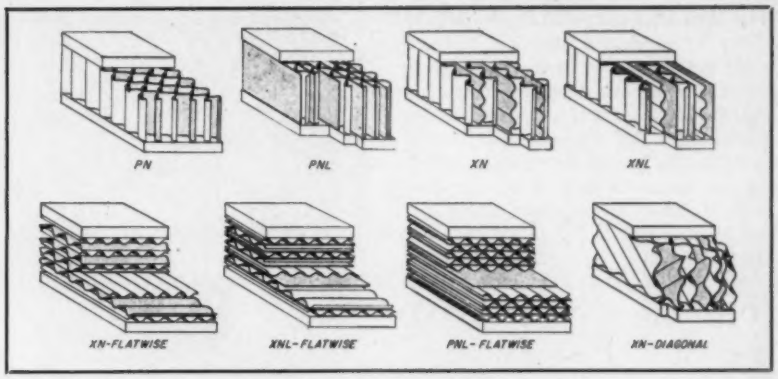


Fig. 2—Various types of corrugated-paper honeycomb cores

Three commercial, relatively low-density, granulated fill materials were investigated to determine their effect on improving the insulating value of honeycomb core. The following were tried: (a) Silica aerogel fill insulation, (b) shredded urea formaldehyde foam, and (c) siliceous volcanic rock material heated to make it expand to a light and fluffy mass. Test panels of honeycomb core, 14 by 14 inches in area and 1 inch thick, were prepared. A thin kraft paper was bonded to one surface of the panel to hold the fill material in the cells. The various fill materials were then shifted into the openings from the other surface. The cores were vibrated slightly to facilitate filling the cells. The puffed siliceous material was more granular than the other two fill materials and seemed to fill the cells with the least vibrating. After the cells were filled, a similar kraft paper was bonded to the other surface.

A few Laboratory attempts to fill 8-foot-long sections of complete sandwich panels having a certain type of corrugated core demonstrated that it would be feasible to fill commercial-size panels after the facings have been bonded to the core. A panel with the core having one-half of the flutes parallel to the 8-foot length and the remaining flutes perpendicular to the facings was used for these trials. With the higher-density, granular materials no particular difficulty was experienced in filling the panel by permitting the granules to sift down the 8 feet of open path. With the lower-density material (pulverized urea foam) the first attempts were unsuccessful, but the panel was finally filled by placing it against a vibrator as the fill material was added.

Since lower-density foams could be obtained by foaming resin into large blocks (without the core) than by foaming in place in a honeycomb structure, attempts were made to force the core into preformed blocks of the low-density phenolic foam. This practice was unsuccessful with these three phenolic foams because of their spongy nature. A foamed polystyrene, balsa wood, and foamed rubber materials, however, were successfully forced into small samples of core.

Thermal insulation tests

Thermal insulation tests of sandwich panels were conducted in the Forest Products Laboratory thermal conductivity apparatus, which consists of a heated central plate, 13½ by 13½ in., having two separate heat sources, one serving the center section, or test area (8 by 8 in.), and the other the border, or frame, which serves as a guard ring (Fig. 4). Two samples were tested at a time and were placed on opposite sides of the heated plate. Movable water-cooled plates were placed in contact with the samples. The heat flow with this arrangement was established from the heated center plate to the cooled outside plates. The amount of electrical energy supplied to the test area and guard ring was adjusted by potentiometers, so that the surface temperatures of the test area and guard ring were practically the same. When this adjustment was reached, the heat flow across the test sample was assumed to be uninfluenced by the area of the sample opposite the guard ring. In other words, the flow of heat was uniform over the test area and there was no loss of heat from the test area to the guard-ring zone. The auxiliary apparatus is shown in Fig. 5.

Samples approximately 1 inch thick were tested between a hot-plate temperature of 102° F. and a cold-plate temperature of 55° F. The mean temperature was about 78° F.

Thermal insulation results

Thermal conductivity values were determined on several different arrangements of corrugated paper core to com-

pare their insulating characteristics (3). Cores in which the corrugated sheets were laid parallel to the faces had much better thermal insulating properties than those with the flutes perpendicular to the surfaces. Of the so-called flatwise cores the best results were obtained with cores in which the flutes of adjacent corrugated sheets were at right angles and flat sheets were laid between the corrugated sheets (Fig. 2, XNL-flatwise). The *k* value of 0.29 obtained with this construction approaches the value obtained with some of the common insulating materials used today. Slightly less effective was the core in which the corrugations were all parallel and flat sheets were laid between the corrugated sheets (Fig. 2, PNL-flatwise). Structures of this type, however, do not have so good mechanical properties as those with vertical cells.

All of the cores having flutes perpendicular to the surface had relatively high conductivity values. A slightly lower conductivity was found in the core having one-half of the corrugations running parallel to the surfaces (Fig. 2, XN). It was assumed that if the XN core were cut on a diagonal with the flutes the thermal conductivity might be improved, since the open path between one surface and the other would be lengthened. A core was tested with the flutes at a 45° angle with the surfaces. Surprisingly, this core had a slightly higher *k* value than the core with one-half the flutes perpendicular to the facings. The PN core, which is similar in structure to the expanded or "figure-8" cores, but has smaller cells, had a slightly higher *k* value than the XN core.

In the structures involving the uncorrugated flat sheet the density of the core was increased by the use of the flat sheet and the thermal insulation value reduced. All of these cores were made using the same weight of paper, and, therefore, the effect of core construction was not determined on a fixed-density basis.

For any given core construction the density of the structure affects the insulation value. The corrugated PNL core was fabricated from both a 50-pound (pounds per 3,000 sq. ft.) and a 30-pound kraft paper. The heavier-weight paper resulted in a core having a density of 5.5 pounds per cubic foot and a *k* value of 0.59 as compared to a *k* value of 0.47 and a density of 3.35 pounds per cubic foot for the core made from the 30-pound paper (Table I). The reduction in weight of paper resulted in an appreciable reduction in the amount of cell wall material between the two surfaces.

One of the principal losses of heat through honeycomb core occurs by conduction through the paper itself. Some heat is also lost by convection in the air cells and some by radiation. In one instance, the contact area of both surfaces of the core was reduced by about 40 per cent to minimize the area available for conduction. This was done by crushing circular areas in the surfaces of the core, leaving only sufficient contact area to produce a satisfactory bond strength between facings and core. This procedure reduced the conductivity from 0.59 to 0.52 British thermal units per square foot per hour per 1°F. This reduction was not enough to warrant further work.

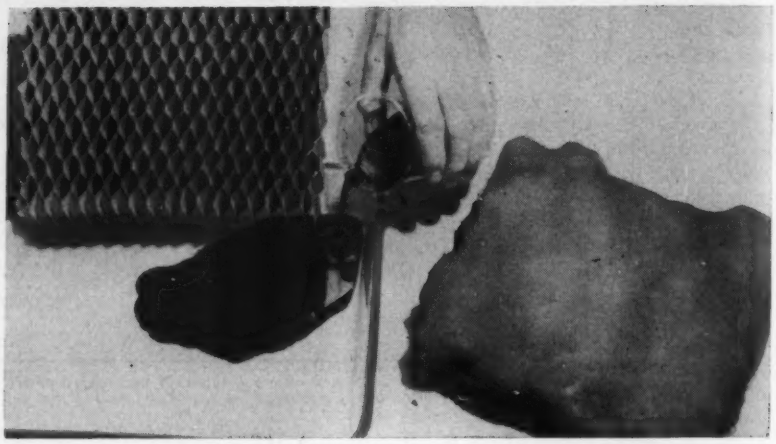


Fig. 3—Left, resin in container before foaming in the core; right, block of core with foamed-in-place resin

Results of attempts to improve the thermal-insulating qualities of honeycomb core materials by foaming resins into the cells or by filling the cells with low-density fill materials were promising (Table II). The *k* value of a given core construction was reduced from 0.58 for the unfilled core to 0.40 for the lowest-density, foamed-in-place resin (resin A). This reduction in *k* value occurred in spite of the fact that the density of the core was increased about 50 per cent. The other two foamed-in-place resins produced higher-density cores and were not so effective in reducing the thermal conductivity value of the core. As stated earlier, the walls of the cells offered resistance to the foaming action, resulting in higher density than desirable.

It would seem possible to obtain still better thermal insulation properties with

Table I.—Thermal conductivity of honeycomb cores with no fill insulation

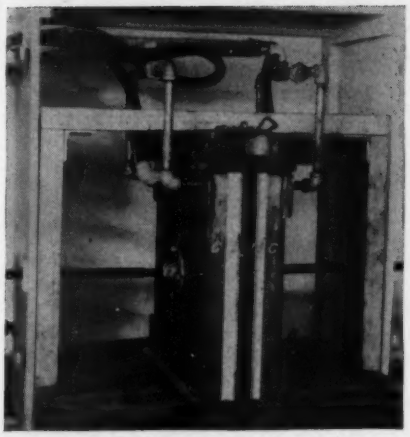
Type of honeycomb core(1)	Weight of paper Lb. per 3,000 sq. ft.	Weight of core Lb. per cu. ft.	Mean temperature °F.	Conductivity value k B.t.u. per sq. ft. per hr. per in. per °F.
Corrugated-PN	50	2.94	75.1	0.47
Corrugated-PNL	50	5.49	77.2	.59
Corrugated-XN	50	2.75	78.6	.45
Corrugated-XNL	50	5.30	76.4	.51
Corrugated-XN flatwise	50	3.75	74.9	.36
Corrugated-XNL flatwise	50	4.68	75.5	.29
Corrugated-PNL flatwise	50	4.25	75.5	.31
Corrugated-XN diagonal	50	2.69	76.9	.48
Corrugated-PNL	30	3.35	76.8	.47
Figure 8	.....	2.89	76.0	.53

(1)For the corrugated core arrangements see figure 2.

Table II.—Effect of foamed resin and fill insulation on thermal proprties of honeycomb cores

Type of honeycomb core	Added insulation	Weight per cubic foot Lb.	Mean temperature °F.	Conductivity value k B.t.u. per sq. ft. per hr. per in. per °F.
FOAMED-IN-PLACE RESIN				
Corrugated-PN	None	3.48	77.9	0.58
Corrugated-PN	Foamed resin A	5.33	77.0	.40
Corrugated-PN	Foamed resin B	8.70	78.3	.41
Corrugated-PN	Foamed resin C	10.52	78.1	.51
Figure 8	None	2.89	76.0	.53
Figure 8	Foamed resin A	5.50	77.6	.38
Figure 8(1)	Foamed resin A	1.88	77.7	.31
FILL INSULATION				
Corrugated-PN	None	3.48	77.9	.58
Corrugated-PN	Shredded urea foam	4.72	77.3	.37
Corrugated-PN	Silica aerogel	6.44	77.5	.35
Corrugated-PN	Puffed siliceous rock	10.68	78.1	.45
Corrugated-XN	None	2.75	78.6	.45
Corrugated-XN	Shredded urea foam	4.08	76.3	.35
Corrugated-PNL flatwise	None	4.68	74.9	.31
Corrugated-PNL flatwise	Silica aerogal	8.47	77.5	.27

(1)Large loops 1¾ inches in diameter made with 20-pound kraft paper.



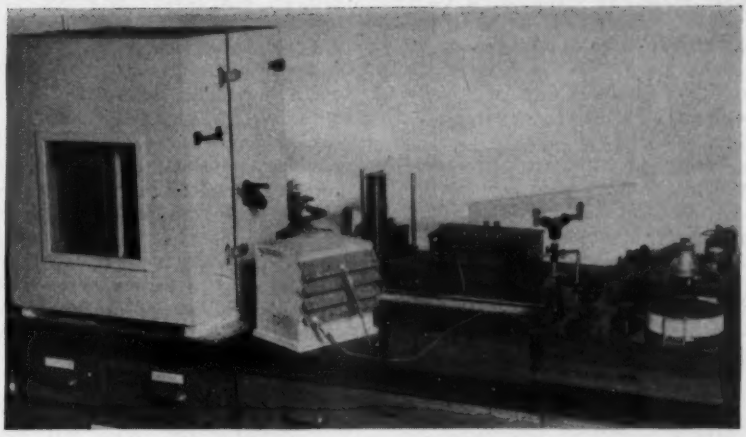


Fig. 4 (left)—Apparatus for determining thermal conductivity; c, plates cooled by running water; g, guarded hot plates; i, test samples. The front of the enclosure is removed. Fig. 5 (right)—Front view of test equipment for determining thermal conductivity. Enclosure for hot-plate equipment is at left

a core containing foam but lower in total density. With a core having relatively larger cell openings (1¼-inch diameter) a lower-density foam was obtained that resulted in a core structure having a density of 1.9 and a *k* value of 0.31. This value approached that obtained when the resin was foamed in block form without a web or core to obstruct the foaming action.

Slightly lower *k* values were obtained with the fill insulation than with the foamed-in-place resin. The silica aerogel fill material yielded a core with a *k* value of 0.35 as compared with 0.40 for a similar core with foamed resin and 0.58 for the unfilled core.

In another corrugated-core arrangement all of the flutes were parallel to the surface, with the corrugated sheets separated by flat sheets (Fig. 2, PNL-flatwise), and the openings were filled with the silica aerogel fill insulation. The fill was responsible for a reduction in thermal conductivity from 0.31 to 0.27 British thermal units per square foot per hour per 1°F. This latter value is about equal to that commonly used for mineral-wool products. This particular core construction has disadvantages, which were mentioned earlier in the report.

Panels for sound absorption tests

Eight sandwich panels, with various arrangements of the corrugated type of core, were prepared for sound absorption tests. Details as to type of core arrangement and facings for the different test panels are given in table 3. The core in all panels was made from 50-pound paper with 15 per cent of resin. Since perforated surfaces are known to favor sound absorption, panels with hardboard facings were tested with and without perforations. The perforations were made by drilling 3/16-inch-diameter holes about 5/16 inch apart in one of the facings; no holes were drilled in the other facing. The perforated facing contained approximately 510 holes per square foot. An aluminum-faced panel with one facing perforated in the same manner was also tested. The natural holes in white-pocket Douglas-fir veneer were also utilized in two test panels. Veneer 1/16 inch thick that was cut from heavy-white-pocket wood had numerous holes and pockets. This veneer was bonded to one side of a panel, and the other facing was made from light-white-pocket Douglas-fir veneer with practically no holes.

In sandwich panels for structural application the core is usually placed in the panel with part or all of the flutes of the corrugated sheet perpendicular to the facing, leaving direct channels from one facing to the other. It was thought that if such cores were placed with flutes on a diagonal to the facings, the sound waves entering the panel would be deflected by the walls of cells, and the sound-absorbing properties of the panel would be improved. Three panels were thus prepared for test in which the core was placed with flutes running at a 45° angle instead of 90° to the facing.

The cores were bonded to the hardboard and veneer facings with an acid-catalyzed, high-temperature-setting, phenolic resin adhesive. The resin was applied to both the facings and the core, and the panel pressed in a hot press using low pressure. In gluing the core to the aluminum facings, a high-temperature-setting vinyl-phenolic glue formulation was used. The temperature of the press was about 300° F., but the panel was cooled under pressure before it was removed from the press.

Table III.—Sound absorption coefficients of panels having various facings and corrugated core arrangement

Panel No.	Description of		Total panel thickness In.	Panelweight Lb. per sq. ft.	Sound absorption coefficient at 500 cycles per second
	Core	Facings			
1	All flutes parallel to each other; corrugated sheets separated by a flat sheet. Core placed in panel with flutes perpendicular to facings (PNL).	¼-inch hardboard	1¼	2.0	0.04
2	Flutes of adjacent corrugated sheets at right angles. Core placed in panel with one-half of the flutes perpendicular and one-half parallel to facings (XN).	¼-inch hardboard	1¼	1.9	.04
8	Same as panel No. 1	¼-inch hardboard with one facing perforated.	1¼	2.0	.56
9	All flutes parallel to each other; corrugated sheets separated by a flat sheet. Core placed in panel with flutes at a 45° angle to the facings (PNL diagonal).	¼-inch hardboard with one facing perforated.	1¼	2.0	.71
10	Flutes of adjacent corrugated sheets at right angles. Core placed in panel with flutes at a 45° angle to the facings (XN diagonal).	¼-inch hardboard with one facing perforated.	1¼	1.8	.61
3	Same as panel No. 1	1/16-inch white-pocket Douglas-fir veneer.	1¼	1.1	0.62
12	Same as panel No. 9	1/16-inch white-pocket Douglas-fir veneer.	1¼	.8	.60
11	Same as panel No. 1	0.020-inch aluminum with one facing perforated.	1-1/16	1.0	.51

Sound absorption tests

Sound absorption tests reported herein were made by the National Bureau of Standards. The so-called "box test" was employed. It is used in experimental and developmental work to indicate whether or not a material has promising sound-absorbing properties. A more elaborate test, known as the reverberation chamber test, is used to determine accurate sound absorption coefficients for use in design data.

The box test as described by the National Bureau of Standards is made on a sample of material 12 by 36 in. at a single frequency of 500 cycles per second. This test can be made only with the material applied to a rigid backing. In the case of acoustical tiles, the rigid backing consists of a brass plate, which is placed behind the tiles in the box. The absorption of the test material is compared with the absorption of samples whose absorption coefficients had been determined previously in the reverberation chamber. The probable error of this type of test is estimated to be ± 0.05 in the second absorption coefficient.

Sound absorption results

Sound absorption coefficients for sandwich panels as determined by the National Bureau of Standards are given in Table III. Preliminary tests were first made on three sandwich panels, two with solid hardboard facings varying only in type of core construction and one faced with white-pocket Douglas-fir veneer. The results showed that neither of the two panels having solid hardboard facings had promising sound-absorbing properties; thus it was not possible to explore the effect of core construction in this preliminary series. The panel faced with white-pocket Douglas-fir veneer, however, had promising absorbing properties. A sound absorption coefficient of 0.62 was determined for it, indicating possibilities of good sound-absorbing properties for sandwich construction.

In the second series panels with perforations in one facing was used. Facings were of hardboard, aluminum, or white-pocket Douglas-fir veneer (natural holes). Core was placed in three of the panels with the flutes at a diagonal instead of perpendicular to the surface in attempt to deflect the sound entering the panel. When the diagonal-flute core was not used, perforations in one of the hardboard facings raised the sound absorption coefficient value from 0.04 to 0.56. A still higher coefficient, 0.71, was obtained when the flutes in the panel were at a diagonal, indicating some deflection of sound due to the walls of the cells. Utilizing the natural holes in white-pocket Douglas-fir veneer resulted in a panel having a sound absorption value of 0.60. Many of the common acoustical materials have sound absorption coefficients greater than 0.60 (5) which was about the average obtained on the sandwich panels with a perforated facing. An appreciable amount of sound is absorbed in these panels, and for many applications they would no doubt be acceptable. It may be possible to obtain higher coefficient values in this type of material by partially filling the cells of the core or by "roughing" the walls of the cells to increase the deflection of sound from the walls.

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Lively safety promotion methods at Scott Paper Company

FRED W. BRAUN

Vice President Accident Prevention
Employers Mutuals of Wausau

ONE OF THE SAFEST places to work in the United States last year was the Scott Paper mill at Chester, Pa. There were only nine lost-time accidents among their 2117 employees. On June 24, 1953, this mill had worked over a million and a half man-hours, 157 consecutive days, without an injury which required time off from work.

The Chester mill has come a long way on the safety road since 1937 when there were 173 lost-time accidents among far fewer employees than they have today. In ten years (in 1947) this figure had been reduced to seven. Since that time the highest peak was 15 lost-time accidents in 1951.

Keep interest alive

This remarkable achievement did not just happen. It was planned, just as quality production is planned. The safety program is a part of management's "Good Millkeeping" program which is aimed to give Scott Paper Company the cleanest, most orderly, and safest paper and pulp mills possible.

Most difficult part of any safety program is keeping the interest alive, and here the activities of Scott are outstanding. Through its public relations department the company employs all the recognized, time-proven techniques of advertising and sales promotion to arouse and hold employee interest in safety. There is nothing startling, and little spectacular, about this Scott safety promotion. "You can't shoot off fireworks every day," says H. F. Taylor, plant promotion manager, who is charged with this activity. "We are dealing with people, just as in advertising promotion," he says. "The only difference in our way of promoting safety is the window dressing. Most accidents happen to our older and more experienced workers. They are the ones most likely to become complacent. Our idea is to surround the employees continually with evidences of safety that work on their subconscious."

Always a new idea

Scott workers entering the plant go past a Scott safety flag which is removed for three days after a lost-time accident. They are faced on every hand with the same safety shield which flashes "Think-Work-Talk Safety" from its red, white and blue background. They receive match books with safety covers. Supervisors are supplied with desk pads with continually reminding safety slogans. Fifteen plant bulletin boards carry individually designed Scott safety posters which show safety standings at various Scott plants and the number of safe working hours to date. These are just a few of many visual safety reminders.

No promotion idea is allowed to wear out before a new one is working. For some years a series of stuffed animals worked their way through various departments as evidence of the department's position in the safety scale. A skunk would repose for a while in the department with the least enviable record. It never stayed long, you can be sure.

Our idea is to surround the employees continually with evidence of safety, says H. F. Taylor, plant promotion manager

A lesson in eye protection is demonstrated by J. N. Conaway, safety manager, by driving a nail into a block with safety glasses

"A wise bird talks for safety" is the heading over the parrot's cage

Mr. Conaway produces photographic evidence to prove safety hazards

This was followed by a live monkey in a cage with the slogan *"Don't monkey with your safety"* prominently displayed on the cage. The monk was displayed in various prominent plant locations and went the rounds of the various Scott plants before his death.

Today's visual safety reminder at Chester is a live parrot who parades back and forth on his perch under the heading *"A wise bird talks for safety."* A three-dimensional lighthouse with *"Safety on the beam"* as its motif is now being prpeared for prominent display.

Takes more than one man

Specific details of safety at Chester are in the hands of James N. Conaway, safety manager. Conaway came up through the mill himself and knows all its ins and outs. He is a team man. "One man cannot police a plant," he says. "You must have cooperation." Plastic clips for the shirt pocket are worn by Conaway and safety committee members which broadcast that "Safety is Everybody's business."

Conaway believes that much of the success of this safety promotion comes from getting a new worker started right. He has a whole bag of tricks that he gets out to emphasize safety to the new employee. He has a block of wood into which he drives a nail, using a pair of safety glasses as a hammer. He shows the new men a beautifully made glass eye. "Look, it even has the natural veins in it," he says. "There's just one trouble with it. You can't see with it." He has a specially made "spinal cord" of wood blocks held together by string. He attaches this to a weight and raises it straight up. Then he tilts the stack into the position of a man leaning over to lift a weight. The string breaks. "That shows what happens to your back unless you lift weights correctly," says Conaway.

Conaway doesn't waste time on little things. But when he does "come to meeting" he is prepared. He takes pictures. Here is a typical memo that was on the back of a photo he showed a department head recently. It said:

"This photograph was taken May 5, 1953, at No. 6 dry broke beater. It shows the safety latch tied back with a piece of string; homemade sign pasted on top of the regular sign and papers scattered over the floor.

"Finishing personnel are using string to tie back safety latches in order to save a little energy. They apparently are indifferent to their own safety and the safety of others. They are also neglectful in cleaning up loose paper on the floor after dumping trucks."

Another photograph read: "This photograph of No. 7 Streamer blower platform was taken at 4:30 PM Friday, May 1, 1953. As of noon May 5, 1953, the platform had not been cleaned and, of course, the accumulation of streamers and dust is much greater. The guard is not in its proper place—over the pulleys and V belts. This is a definite safety hazard." It is hard to talk your way out when confronted with photographs with such names, dates and places.

Papermaking is a business of movement. Materials are continually on the move from one place to another. Almost anything can be around any corner. Power trucks, hand trucks, and conveyor systems — all in motion — accentuate the fact that real safety is not possible unless everybody makes safety, both for himself and for the other fellow, a prime consideration. No amount of machine guarding or safety rules will keep people from getting hurt—unless the concept of safe working has got under the hides. That is the purpose of Scott's unique program of sales promotion to get safety into the subconscious.

The Royal Institute of Technology and the Concert Hall in Stockholm Sweden. Photos by K. W. Gullers.

Symposia on the chemistry of wood and pulp

Held at the Thirteenth International Congress of Pure and Applied Chemistry in Sweden

LOUIS ELSBERG WISE
The Institute of Paper Chemistry

The latest discoveries in minor constituents of wood, chemistry of the bark, celluloses, lignin chemistry and utilization, pulp properties, and pulping methods

THE 13th CONGRESS met at Stockholm July 29 to August 4, and then held another brief meeting at Uppsala August 5 to 7. Nobel prize-winner Arne Tiselius welcomed the visiting scientists, and such eminent men as Dr. E. W. R. Steacie (of Ottawa, Canada), Professor Linus Pauling (of the California Institute of Technology), and Dr. Harold Urey (of the University of Chicago) spoke early in the meeting. Ivar Perrson, Swedish Minister of Education, made a speech at the opening ceremonies. The honorary president of the meetings at Stockholm and Uppsala was the famous Thé Svedberg.

The present brief report makes no attempt to cover fully this great meeting of scientists from all parts of the world, with its four hundred scientific papers, its exhibits, social gatherings, musical programs, dramatic performances, and public lectures. Of necessity it must focus on the symposium on Wood Chemistry (which really developed into a series of symposia), and more especially on those papers and excursions which are of direct (or indirect) interest to the paper industry and allied industries. Nearly 100 papers were devoted to subjects closely or remotely connected with these fields.

The overall chairman (or "president" as he was termed) of this part of the Congress was the distinguished Dr. Erik Hägglund, Professor of Wood Chemistry at the Royal Institute of Technology, and Leader of Chemical Studies at the Forest Products Research Laboratory in Stockholm. Hägglund is known for his books and for his many contributions to the chemistry of wood, and wood pulps. An honorary chairman of the cellulose group was the noted Professor Hermann Staudinger (of the State Research Institute of Macromolecular Chemistry at Freiberg) whose work on macromolecules (with special emphasis on cellulose) is classical. Three "chairmen of the day" presiding at the cellulose meetings deserve mention. They were Professor E. D. Kaverzneva (of the Institute of Organic Chemistry at the Academy of Sciences in Moscow), Professor O. Kratky (of the University of Graz, in Austria) and Professor Melville E. Wolfrom (of Ohio State University). Genial Dr. Kyle Ward, Jr., of The Institute of Paper Chemistry at Appleton served ably as discussion leader.

Minor constituents of wood

Actually there were three groups of interest to our readers. One was on the minor constituents of wood ("Group 21") under the chairmanship of the brilliant Dr. Holger Erdtman (Professor of Organic Chemistry at the Royal Institute of Technology). "Group 22" was the Cellulose and Pulping Division referred to above, and "Group 23" dealt with wood, lignin and certain phases of chemical pulping. In the session of Group 21, the minor components of wood and bark were discussed in some 38 papers. Space will not permit even brief abstracts of most of these, and some of them will not even be listed by title. Dr. K. Venkataraman (of Bombay University) spoke on chromane derivatives of wood. Inasmuch as these are phenolic, and as some of them inhibit sulfite pulping, his review is significant. Dr. S. Hattori (of the Botanical In-

Prof. Erik Hägglund, general chairman of the symposia on wood chemistry. Dr. Hägglund is professor of wood chemistry at the Royal Institute of Technology and director of chemical studies at the Forest Products Research Laboratory, Stockholm

The Swedish Forest Products Research Laboratory. This picture has been cleared for reproduction by the Swedish military authorities. Pictures through courtesy of H. W. Giertz.

stitute Hongo University in Tokyo) spoke of the flavonoids of the woods of the *Prunus* species. His data were taxanomic as well as chemical, and inasmuch as certain cherry woods are used in pulping, and may contain pulping inhibitors, his findings deserve mention. The separation and identification of flavonoid compounds on a micro scale formed the subject of a paper by T. Swain and C. G. Nordstrom (of Cambridge, England). The chemistry of heartwood constituents of conifers in relation to taxonomy was reviewed ably by Professor Erdtman himself. Some of these compounds have insecticidal and fungicidal properties, and they occur in the Genera *Pinus, Thuja,* and *Chamaecyparis* (which include some important wood species used in pulping).

The necessity of further studies of hardwood extractives was emphasized by Sir John Simonsen (the great authority on terpenes) and Dr. F. E. King (of Nottingham University). The work of these chemists was confined to tropical timbers, some of whose extraneous materials may be of future commercial interest. (The extractives of own native angiosperms species should also be more closely examined.)

Chemistry of the bark

Several papers in this session were devoted to the chemistry of bark, an important by-product of all the wood-using industries. Thus, Dr. J. Jack and his associates at the University of Cambridge examined the leucoanthocyanidines of the root bark of an Australian tree *Celastrus dispermus*. Dr. Purves and his co-workers at McGill University studied the action of liquid ammonia on solvent-extracted white spruce bark. Initial extraction with methanol and water dissolved about 44 per cent of the bark. Subsequent treatment with liquid ammonia removed: acetamide, oxamide, and glycerine, lignoceryl amide, and the amides of (what appeared to be mixtures of) fatty acids. Amorphous phenols were also removed. The residual bark was then, in part, water-soluble, and yielded small amounts of tannins and carbohydrates. In Finland, the cork tissues of an oak *(Quercus suber)* and a birch *(Betula verrucosa)* were studied. From this suberin, Professor W. Jensen (of the Abo Academy) isolated: $HO_2C(CH_2)_{20}CO_2H$, $HOCH_2(CH_2)_{20}CO_2H$, $HO_2C(CH_2)_7(CHOH)_2(CH_2)_7CO_2H$ and $HOCH_2(CH_2)_7(CHOH)_2(CH_2)_7CO_2H$. A new acid $C_{18}H_{34}O_4$ was also separated and studied.

The constituents of a wood-rotting fungus *(Polyporus betulinus)* which attacks silver birch, were examined by Halsall and Jones of the University of Manchester. A number of interesting acids were isolated, and the structures of several of these were elucidated. Dr. Di Modica (of the University of Turin, Italy,) reported on components of the heartwood of *Cupressus sempervirens.* (Italian cypress). The wood is resistant to insect attack and contains some astringents which give it a certain therapeutic importance. One of the components ($C_{11}H_{14}O$), a liquid, was studied.

Xylans

Since xylans are so widely distributed in wood and in straw and also in certain pulps, the report by Professor E. L. Hirst on their structural relationships in various polysaccharides was of special import. A xylan from esparto pulp contained only about 75 β-1, 4-linked xylopyranose units. From the cell-wall of the pear a similar xylan (with a degree of polymerization of 130) was isolated. Wheat and barley straws gave xylans which contained uronic acid groups. In the case of beechwood a xylan was isolated retaining about 10 per cent glucuronic (or 4-methyl glucuronic acid units). Besides these, there is quite a wide range of polysaccharides in which arabinose units are linked to the xylose chains. Apparently, among the hemicelluloses, these araboxylans (some of them also containing uronic acid residues) are widely distributed.

Some of the commercial by-products of the kraft industry were also dealt with at the meeting. Dr. J. P. Bain of the Glidden Co. (Naval Stores Division) at Jacksonville showed that sulfate turpentine contained, besides the pinenes, a number of terpenes and terpene derivatives (not reported previously) as well as aliphatic alcohols and ketones.

Tall oils and resins

The composition of six representative Canadian tall oils was studied by R. V. V. Nicholls of McGill University. These oils contained a relatively high percentage of saturated acids. One sample was separated into three sterols, three linear alcohols, and 5 cyclic alcohols. α-Sitosterol was (for the first time) identified, and most of the alcohols (other than lignoceryl alcohol) do not appear to have been isolated previously from any tall oil. A method for separating tall oil into rosin acids, fatty acids, and sterol fractions by solvent extraction and molecular-complex formation was originated; this separation may have industrial possibilities. Dr. Nicholls attempted to relate his data to the species of wood pulped.

Dr. Arthur B. Anderson of the University of California, one of those rare scientists who interest in basic problems does not overshadow his practical sense, gave a stimulating talk on increasing the extractive content of ponderosa and Jeffrey pines. When an incision is made in the sapwood of the living tree and sulfuric acid is then introduced into the wound, a great deposit

of extractives forms above and below the incised area. This region then contains about 18 per cent extractives, in place of the few per cent originally present, and this extract resembles (but is not identical with) that in old growth heartwood. Fatty acids and certain phenols are not produced, thus showing the difference between this artifically induced resin and that of old growth heartwood. This artificial extract formation may have commercial possibilities. For example, young pines might produce, in less than a year, resins, which would require years of heartwood growth in a normal tree.

That resin acids from conifers may serve as raw material for the production of pharmacologically active compounds was the thesis presented by Dr. W. Sandermann of Hamburg-Reinbeck, Germany. For example 6-dehydrohydroxyabietinol shows marked estrogenic activity, and other examples were cited.

Cellulose studies

Among the papers presented in group 22, Dr. A. Frey-Wissling's talk on the aggregation and individuality of submicroscopic fibrils of cellulose headed the list. Dr. H. J. Wellard (of the British Rayon Research Association) spoke on the variation in lattice spacing of cellulose. The chemical constitution of native celluloses, were studied by Dr. G. W. Schultz and his associates of the University of Mainz. Diffusion and ultracentrifuge sedimentation constants of nitrated cellulose were determined and molecular weights calculated. The relationship between these and intrinsic viscosities were reported, and from viscosity determinations the average molecular weights of cotton, China grass-, wood- and bacterial-celluloses were calculated. Kinetic hydrolytic experiments indicated that cotton and wood celluloses contained about 0.2 per cent of sensitive linkages ("lockere Bindungen"), which occur at fairly regular intervals.

The relationship of acid hydrolysis of cellulose to its structure was also studied by Allan Sharples (of Manchester). He found that the sensitive linkages occurred randomly about once for every 1000 glucose units. The hydrolytic degradation and crystallinity of cellulose was also studied by Linderot and Gralén (of the Swedish Institute of Textile Research).

The following papers deserve mention: (a) The cellulose of *Acetobacter acetigenum* (by K. S. Barclay and associates, of the University of Birmingham); (b) Infra-red absorption spectra of cellulose (by S. A. Barker and associates at Birmingham); (c) Ultraviolet studies on cellulose and its derivatives (by E. Treiber of the University of Graz); (d) Selective reactivity of "position two" of cellulose (by Dr. Wolfrom and Dr. El Taraboulsi of Ohio State University); (e) Mercerization of wood and cotton cellulose (by Dr. B. G. Ranby, of Uppsala); (f) The oxidative degradation of cellulose (by Professor E. D. Kaverzneva, of Moscow); (g) The oxidation of cellulose by hypobromite and hypochlorite-bromide mixtures (by Dr. Menachem Lewin, of the Research Council of Israel); (h) The dual character of carbonyloxycelluloses (by W. M. Corbett, and associates at the British Rayon Research Association, of Manchester); (i) The acidity of carboxyl groups of cellulose (by Dr. H. Sihtola, Helsinki, Finland) and (j) Hydroxyanionic compounds of cellulose (by Professor R. H. Roschier, of the Institute of Technology in Helsinki). A number of these merit more than this casual mention, but our space is limited.

The advances in hemicellulose chemistry were emphasized by Professor Roy L. Whistler (of Purdue University), who pointed out the compelling interest of these polysaccharides to the industrialist as well as to the chemist and botanist. The acetylation of hemicellulose was outlined by Dean Edwin C. Jahn (State University of New York, College of Forestry at Syracuse), thus presenting the work of Mr. Mamerto Cruz.

The non-resistant components of *Eucalyptus regnans* wood (an important Australian pulpwood) were discussed by Dr. C. M. Stewart (of South Melbourne, Australia), and Dr. L. Jörgensen (of Billeruds, Säffle in Sweden), spoke on the chemical composition of alkali soluble fractions (i.e. the *beta* and *gamma* portions) of cellulose. Dr. Jörgensen found no experimental support for the view that the fractionation of these components gave degraded cellulose on the one hand and hemicellulosic material on the other. All fractions proved to be mixtures containing all the sugar units found in the original fibers.

Of the eight interesting papers on cellulose derivatives which were presented before Group 22, (coming from the U.S.A., Holland, Germany, and Italy), five dealt with cellulose acetate, one with cellulose xanthate, one with "grafting polymers" on cellulose, and one with the dichroism of dyed regenerated cellulose fibers. One of the papers on acetate (by Dr. H. W. Steinmann and associates, of the Celanese Corporation) discussed the mannan content of purified wood pulp and its relationship to cellulose acetate properties.

Pulp properties

Section 22 also included six papers specifically devoted to the properties of pulp. Dr. W. Klauditz (Institut für Holzforschung, Braunschweig, Germany) spoke on the chemical and physical action of the hemicelluloses in relation to papermaking. As a result of his studies on birchwood, he believes that the action of polyuronides is significant and he stressed (as he had previously) that the morphology and anatomy of the raw material are important in determining the physical properties of the paper sheet. Dr. H. W. Giertz (of the Swedish Forest Products Research Laboratory) indicated that, whereas in normal sulfite pulps the amount of hemicellulose correlates well with water sorption, sheet density, and strength properties, other pulps (such as alkali-refiner, hydrolyzed sulfite, and kraft pulps) do not show this correlation. Properties such as tensile strength, burst, and opacity depend primarily on density, and it seems that, as long as a certain sheet density is achieved, it is immaterial whether this is obtained by short beating time on pulps rich in hemicelluloses, or long beating time on pulps containing little hemicellulosic material.

Non-woody fibers

Dr. Julius Grant, well-known technologist of Great Britain, pointed out the papermaking importance of such non-woody fibers as straw, bagasse, esparto, bamboo, and other localized plants. The celluloses should not be considered merely substitutes for wood, but their uses should be judged on the basis of their characteristic properties.

Dr. J. Vene and J. Courtet (of the University at Rennes, France) spoke of the influence of mineral impurities on the electrical properties of the paper sheet. The influence of chlorine ion and of sodium and potassium ions was definitely unfavorable, whereas those of the alkaline earths and of the heavy metals had less harmful effects. Per Ekwall and Henrik Bruun, of the Abo Academy in Finland outlined their surface-chemical studies on rosin sizing. The factors influencing the interaction of aluminum ion and resin acid monolayers were defined by surface balance studies. When the reaction had gone to completion the rosin acid had been converted into a dibasic aluminum resinate. Contact angle measurements were used in their studies.

A hydrodynamic approach to the pulp-beating process was reported by B. Steenberg and S. Petterson (of the Swedish Forest Products Research Laboratory). The pulp passed through well-defined shear areas in a new instrument of the disc-refiner type, and measurements were carried out in accordance with the technique used for rotating viscometers. The behavior of the pulp in the zone of beating was discussed.

Lignin studies

In Group 23, devoted to fundamental lignin studies, to various phases of pulping and to lignin utilization, Professor

A. V. Wacek spoke on the methoxyl content of sprucewood. Special attention was focused on the methoxyl groups not in the Klason lignin, with a view towards attaining a methoxyl balance in the wood.

Interestingly enough, two independent laboratories arrived at the conclusion that carbohydrate units are chemically bound to lignin. One group included Drs. P. Traynard, A. M. Ayroud, and A. Eymery of the French School of Papermaking at the University of Grenoble. The other investigator launching a totally different mode of attack, was Dr. H. Richtzenhain (of the Forest Products Research Laboratory of Stockholm). In either case experimental evidence was presented in favor of a lignin-carbohydrate complex. (Scientific proof of such a complex however is exceedingly difficult).

Dr. Paul Lange (of Stockholm), using his knowledge of mass distribution coefficients for carbohydrates and for lignin, studied (by microradiographic techniques) the variations in relative density within the cell walls of spruce *(Picea excelsa)* and of birch *(Betula verrucosa)*. Other fundamental papers showing the great activity in the lignin field, which were presented, were (a) the synthesis of C^{14} labelled coniferin by Kratzl (University of Vienna); (b) structure of native lignin and the mechanism of lignification (by F. F. Nord of Fordham University); (c) nitrobenzene oxidation of some lignin model compounds (by J. C. Pew of the U.S. Forest Products Laboratory); (d) the lignin distribution in the plant cell wall, as studied by chemical treatments (by P. Traynard, *et al.*, Grenoble); (e) the degradation of lignin model substances with sodium hypochlorite (by H. Richtzenhain and B. Alfredsson); (f) various studies on lignin and wood (by W. Fuchs, Technische Hochschule, Aachen, Germany); (g) hydroxybenzyl ethers as lignin models (by H. Mikawa, Tokyo); (h) phenolic groups in lignin (by Gunhild, M. E. Aulin-Erdtman, Stockholm); (i) reaction of native lignin with quinone monochloroimide (by J. Gierer, of Stockholm); (j) studies on the reactive groups of native lignin (by Erich Adler and Josef Gierer, Stockholm); and (k) a new model substance for the B' groups in lignin (by Marit Goliath *et al.*). The last three of these papers emanated from the Swedish Forest Products Laboratory.

Pulping studies

A number of interesting articles on pulping were also presented before Group 22. Thus, George A. Richter delignified several wood species with sulfurous acid of increasing concentrations at temperatures ranging from 0° to 130°C., and the low temperature reactions were made over periods extending up to a year. The degree of sulfonation and removal of solubilized lignin were determined, and a series of conclusions and hypotheses were drawn from this work.

Aspen delignification

Delignification of aspen by neutral sulfite was reported by Necmi Sanyer and E. C. Jahn of Syracuse. The neutral sulfite cook apparently delignified by a sulfonation reaction and a cleavage of lignin polymers.

The following three papers emanated from the University of Helsingfors, Finland. The reactions of sulfur compounds during kraft pulping of sprucewood were studied by T. Enkvist who analyzed the resulting thiolignins by an ultramicro-method, which was described by Lars H. Andersen of the same laboratory. Paper chromatography was applied to ether soluble degradation products of various thiolignins by J. Lindberg; about eleven fractions were obtained, and some known (and several new) compounds were isolated.

An interesting paper was that of E. Venemark of Husum, Sweden, who compared the influence of cyanides and sulfides in alkaline delignification. Under certain conditions it was possible to cook with a liquor containing cyanide, so that the yield, pentosan content, and viscosity of the product resembled those of a sulfate pulp. Extreme treatments with cyanide however gave rise to marked difficulties in cooking and bleaching.

Lignin utilization

Two papers on lignin utilization were also presented. Ippolito Sorgato (of Palermo, Italy) discussed the chemical reactions involved in lignin molding. Louis Ricciardi and Donald F. Othmer (of the Polytechnic Institute, Brooklyn), described the preparation (at 200-260°C. under pressure) of new lignin compounds containing small amounts of sulfur or cresols. Such products could be used as bonding agents, thus permitting the production of wallboard from sawdust.

At the end of the session, on July 31, there was a general round table discussion on lignin opened by a consideration of unsolved problems in lignin chemistry. This was led by Dr. F. E. Brauns of The Institute of Paper Chemistry, whose long term researches and comprehensive monograph on the chemistry of lignin, coupled with his insight and enthusiasm made him an ideal leader in this field.

Plenary addresses

During the course of these group meetings (i.e. Nos. 21, 22, and 23), three stimulating plenary addresses were given before the entire assemblage, one on each of three days of the symposium.

On July 29, Professor Karl Freudenberg (of Heidelberg University) eminent in the field of tannins, carbohydrates, and wood chemistry, gave a lecture on "The constitution of lignin."

On July 31, Dr. L. Ruzicka, Professor of Organic Chemistry at the Polytechnikum at Zürich, Nobel prizewinner, and leading authority on resins, terterpenes, hormones, etc.; gave a talk entitled "From abietic acid to lanosterol." (Natural lanosterol was originally isolated from wool fat.)

The final address on "Current problems affecting the wider use of wood as a technical raw material" was given on August 3, by Dean H. F. Lewis of The Institute of Paper Chemistry. This was a characteristically stimulating talk, given with Dr. Lewis' usual felicity and verve.

Pulpmill visits

On August 3 began a series of visits to pulp mills of the Swedish Cellulose Co. in the Sundsvall district. At Svartvik the visitors witnessed the manufacture of dissolving pulp and the production of sulfite alcohol. At Östrand they saw the production of kraft pulp, chlorine, and alkali, and at Skönsmon the cellulose and wood research laboratories were inspected. The excursion ended August 5, after a scenic bus trip along the lovely Indalsälven river. In place of these trips, on August 4, chemists who wished to remain nearer Stockholm, visited the neighboring pulp mills of Stora Kopparbergs Belgslags A-B. (manufacturing sodium bisulfite pulp, kraft pulp, and organic products) at Skutskär; and the Newsprint Mills of Holmens Bruks och Fabriks A-B. at Hallsta. There were at least seven other industrial excursions in which (among many other points of interest) the sulfite mills, chlorine dioxide-bleach plants, kraft mills, paper mills, organic chemical plants, and research laboratories of Mo och Domsjo A-B. at Ornsköldsvik, Husum, and Hörnefors were visited. This vast concern, using sulfite alcohol as a starting product, manufacturers a large number of industrially useful organic chemicals. The expeditions also included Uddeholms A-B. (sulfite and prehydrolyzed sulfate pulp, paper, etc.) at Skoghall (near Karlstad); Billeruds A-B. (sulfate, and sulfite dissolving pulps, and greaseproof and wrapping papers) at Säffle, and the Swedish Institute of Textile at the Chalmers Institute of Technology.

Tours were also made through the Royal Institute of Forestry, the Forest Research Institute of Sweden, the Institute of Organic Chemistry and Biochemistry of the University at Stockholm, the Royal Academy of Science, the Karolinska Institute, and the Royal Institute of Technology.

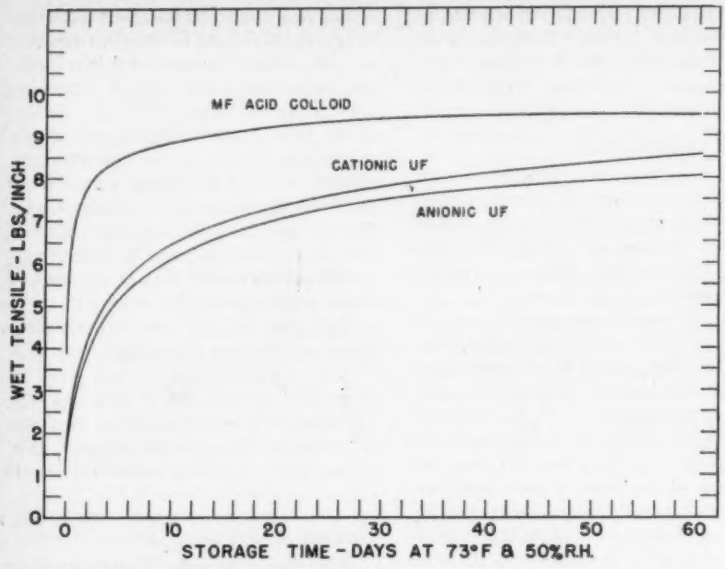


Fig. 1—Relative rates of cure at room temperature

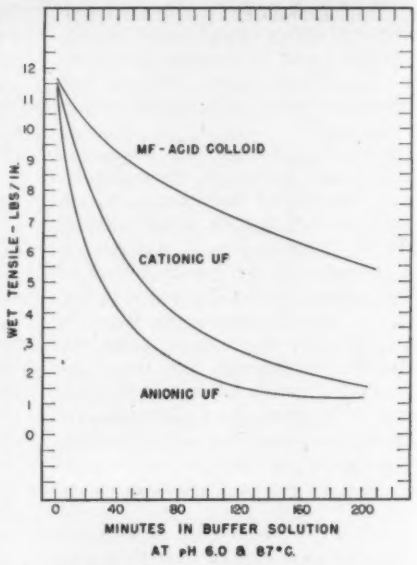


Fig. 2—Loss of wet-strength on immersion

Melamine-formaldehyde resins for use in wet-strength papers*

More than 2,000,000 tons of melamine resin treated papers were used during the past decade

MELAMINE-FORMALDEHYDE was the first resin developed for the wet-strength treatment of paper by slush stock adition. This development followed a dramatic laboratory discovery more than a decade ago—that the aging of an acidified melamine-formaldehyde solution transformed the water-soluble compound into a hydrophilic colloid which is adsorbed quantitatively on negatively charged cellulosic fibers. This process was and still is practical even under conditions of extreme dilution. Felting and drying of the melamine-resin-treated fibers results in a finished paper improved by the added quality of wet-strength.

Melamine resin as an acid colloid found immediate application in the manufacture of wet-strength army combat maps. After World War II, the paper industry turned to civilian applications for wet-strength papers. During the past decade more than two million tons of melamine-treated papers have been used in toweling, facial tissues, auto, home and industrial wiping papers, napkins, ice-cube bags, potato bags, beer cases, and many other products. Even molded pulp products such as flower pots, door fillers, and apple packing trays are treated with melamine resin. Melamine resins have also found their way into food wrapping and packaging papers. In addition, surgical instrument wrapping papers, disposable hospital bed pads, baby bibs and diaper liners have been made possible through the use of melamine resin treated papers. Recent announcements by the American Cyanamid Company of new developments in paper and paper products, many of which will be sold as Melostrength† resin treated papers, has spurred research efforts to find additional uses for wet-strength papers. Among the experimental products made from paper treated with melamine resin, are disposable bathing suits, rain capes and hats, kitchen aprons and Summer and Fall ensembles.

General properties

The unique properties of melamine-formaldehyde resin have been duplicated in part by urea-formaldehyde resins which, however, have been modified by additives which impart anionic or cationic properties to the resin. Melamine resin is shipped in paper bags as a dry powder (97-100 per cent solids). It is stable indefinitely and may be stored at paper mills with no care other than that of keeping it dry. For use it is dispersed in dilute commercial muriatic acid and allowed to age for a minimum of three hours to develop its colloidal form.

Specific properties

Melamine resin appears to be equally effective in all types of pulp while urea resins seem to be more selective in their choice of pulps. This is particularly true of the anionic type urea resins which are really effective only in unbleached kraft. The effect of these resins on various pulps is illustrated in Table 1.

Melamine resins are easier to cure than urea resins. Therefore, melamine-resin-treated paper directly off the machine will be much closer to full cure than paper treated with urea resins. From a practical viewpoint this minimizes the necessity of keeping the paper several weeks for retesting to determine whether standards have been met. Accelerated aging tests can be developed, but these are of little assistance unless carefully correlated with off-machine and natural aging data. The relative rates of cure of melamine and urea resins are shown in Fig. 1.

*Submitted for publication by Barber & Baar Associates Inc., New York.

†Trade-mark of American Cyanamid Company.

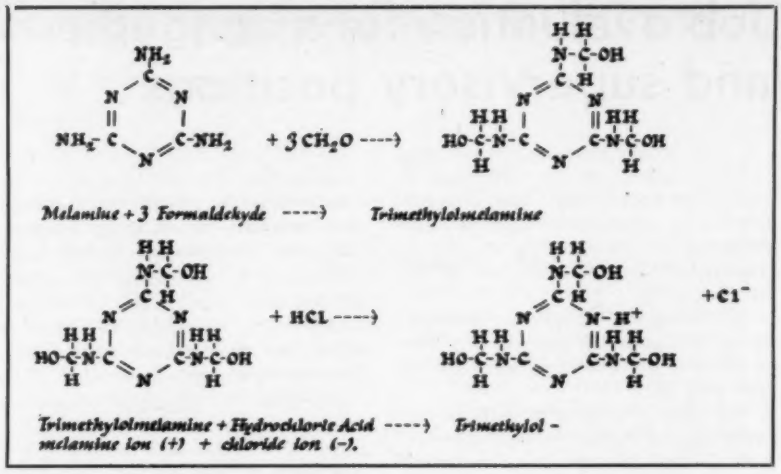

Melamine + 3 Formaldehyde ----> Trimethylolmelamine
Trimethylolmelamine + Hydrochloric Acid ----> Trimethylol - melamine ion (+) + chloride ion (-).

Fig. 3—Steps in the formation of melamine resin

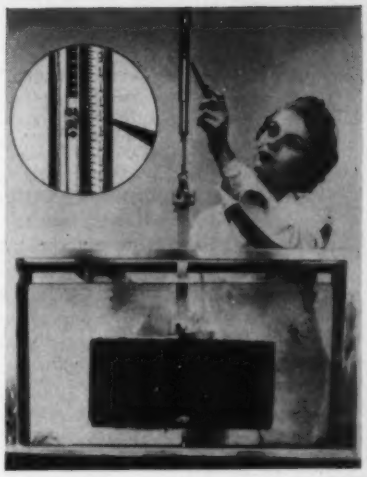


Fig. 4—Even when thoroughly wet, paper strip was able to support this 13 lb. weight

Under normal usage the melamine resin acid colloid appears to be completely retained by the fiber in contrast to urea resins, which probably have a retention ranging up to a maximum of 60 per cent. Loss of fines through the wire, however, usually reduces these retention values in practice. (The large surface area of the fines adsorb a considerable fraction of wet-strength resin before passing through the paper machine wire.) It has been indicated that these recirculated resin-rich fines are of only minor value in building up wet strength when subsequently retained in the sheet. There is also a possibility that the non-adsorbable resin fraction of the urea resins contributes to foaming troubles on the machine.

One of the most striking properties of melamine resin, in contrast to urea resins, is its resistance to acid hydrolysis. This property has contributed substantially to lengthening the life of melamine - resin - treated army combat maps, laundry tags, food wrapping, paper bags, and boards, to name a few —all of which retain their strength longer than urea-resin-treated papers when subjected to acids found in city air, soil and in fruits, vegetables and meats. The effect of hydrolysis on papers treated with melamine and urea resins is shown in Fig. 2.

Melamine resin tends to "slow" paper stock so the addition of melamine resin to pulp reduces the time required for refining and may effect a substantial power savings. In this case it is believed strength is achieved through resin-fiber bonding instead of through gel hydration bonding of the fibers. This belief derives support from research done by the United States National Bureau of Standards. As a result of the reduction in beating time through the use of melamine-formaldehyde resin, it is possible to increase dimensional stability of the treated sheet while surface pick, tendency to lint, and tendency to curl are reduced. These properties are of importance in all kinds of printing and photo papers.

Use of melamine resin

Commercially, melamine resin is sold as Parez ® Resin 607 and as Melostrength Resin. It is made for addition, as an acid colloid, to the pulp in slush stock form.

The acid colloid may be added at various points between the beater and the machine, the best location depending upon existing conditions at the mill.

Chemically, the steps in the formation of the resin itself and the acid colloid are thought to be as shown in Fig. 3.

The trimethylol melamine ion condenses through the hydroxyl groups with decreasing speed. Within three hours it forms particles in the colloidal range consisting of 10-20 of the monomer units. The colloid remains stable for two to three weeks at room temperatures.

Summary

Melamine resin not only increases the wet-tensile and wet-bursting strength of paper but also increases the dry tensile and burst and materially increases the dry folding endurance. Wax-pick values are increased while the tendency to lint and curl are decreased. Dry tear tends to be reduced slightly but wet tear is increased many times over that of untreated papers.

Table I—Effect of Types of Pulp on Efficiency of Wet-Strength Resins

	Tensile strength—lb./in.															
	Rag		Alpha		Bleached kraft		Unbleached kraft		Unbleached groundwood		Unbleached semichemical		Bleached sulphite		Unbleached sulphite	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
No resin	22.5	1.2	16.6	<0.4	22.0	1.1	21.0	0.8	11.2	0.6	28.6	1.6	13.1	<0.4	23.6	0.8
MF-acid colloid	29.0	12.0	25.7	8.8	29.2	9.0	28.8	8.2	14.8	5.4	31.6	5.2	22.6	6.6	30.1	9.4
Anionic UF	23.2	3.0	18.2	2.1	27.0	3.4	33.0	7.0	13.0	1.6	26.8	2.2	16.7	1.9	24.0	1.7
Cationic UF	27.0	6.1	23.8	6.6	29.4	7.0	28.8	7.4	13.8	4.2	28.6	4.2	22.3	6.0	29.7	9.2

	Other test data															
	% Resin in sheet	MIT fold	% Resin in sheet	MIT fold	% Resin in sheet	MIT fold	% Resin in sheet	MIT fold	% Resin in sheet	MIT fold	% Resin in sheet	MIT fold	% Resin in sheet	MIT fold	% Resin in sheet	MIT fold
No resin	....	408	....	36	....	326	....	435	....	<2	....	198	....	....	....	....
MF-acid colloid	2.3	2575	2.2	955	2.2	833	2.3	1657	2.4	<2	2.0	394	1.6	....	1.8	....
Anionic UF	0.4	587	0.3	71	0.5	373	1.3	1373	0.8	<2	0.6	172	0.2	....	0.3	....
Cationic UF	1.3	1253	1.5	616	1.7	996	2.0	1399	2.2	<2	1.6	432	1.3	....	1.6	....

Note: 3% resin added in all cases.

Job evaluation for management and supervisory positions

J. A. KELLER
Vice President
George Fry
& Associates

JOB EVALUATION is a management technique suitable to broad and general usage. In earlier articles we explained the basic principles and applications of job evaluation, especially as they pertained to shop or office jobs. The principles of job evaluation, though, apply and may be used just as effectively in establishing equitable salary levels for supervisory and management type positions.

While industrial giants such as General Electric and Lever Brothers find job evaluation a necessity in establishing and maintaining equitable wage differentials at all levels of their companies, many small firms are also utilizing job evaluation as part of a well-rounded program of management salary administration. These smaller firms realize that job evaluation can impartially establish the relative difficulty and importance to the company of jobs that are primarily of a supervisory and a decision making nature. The existence of a sound job evaluation program does much to control a large element of overhead and administrative cost—that of supervisory and executive wages and salaries. Management personnel know and like job evaluation, as we pointed out in an earlier article, though the proper announcement and management support for a job evaluation program is especially important here.

Job evaluation is a helpful adjunct in defining management responsibilities and developing a clear and efficient organizational structure. The careful analysis of each job almost invariably brings to attention areas of overlapping responsibility, conflicting lines of authority, possible over or under-centralization and other organizational weakness that require consideration. Good job descriptions provide a valuable start in preparing an organiaztion manual and also assist management in selecting men to meet the specific requirements of positions to be filled.

It is not to be inferred that job evaluation of management type jobs is as easy or as subject to standardization as job evaluation of shop or clerical positions. Job evaluation of higher level jobs is naturally more difficult because

(1) It is more difficult to establish the actual job requirements and not just the qualifications of the man currently on the job.

(2) The importance and over-all functioning of a higher level position fluctuates more than a shop or clerical job, depending on the ability of the incumbent.

(3) Intangible, difficult to measure factors like judgment and ingenuity are of primary importance in management type jobs.

(4) There is a greater variation of important job factors in such different jobs as that of advertising manager, chief chemist, and financial vice president than one would find between the lowest and the highest shop jobs.

It is possible, nevertheless, to overcome the difficulties mentioned above and to develop an effective evaluation plan which is relatively simple, readily understood, and which can be easily installed and maintained. The problem of evaluating a position where "the man makes the job" or where the job is subject to considerable change can be met if the evaluation reflects the duties and responsibilities of the job without reference to personalities, present pay rates, titles, or organizational levels. Basic job requirements change rarely and the great variations sometimes noted in the performance of two men holding the same job successively should usually be compensated through merit pay increases or some form of incentive payment rather than in the job evaluation. It is, of course, essential to provide sufficiently wide pay ranges in the salary structure to provide for outstanding performance in higher level jobs where the greatest variation can occur.

The difficulties inherent in evaluating abstract abilities required for management type jobs and in establishing a suitable job evaluation plan are met and solved in a soundly conceived program. A plan of job evaluation of management and supervisory positions must of necessity be a tailor-made installation to fit the organization, emphasis, and problems of a specific company. While the basic principles of job evaluation apply equally to a public utility, a fashion apparel department store, or a paper company, the whole orientation of the firm should certainly affect the weighing of different factors.

An analysis of the many factors frequently mentioned as having influence upon salaries paid for management level positions reveals that these factors naturally group themselves into four major factors.

Knowledge. The basic "know-how", a combination of education and experience, necessary to discharge assigned duties and responsibilities satisfactorily.

Operating Responsibilities. The degree of complexity and difficulty of required decisions and actions, and the extent to which these decisions and actions affect the company's operations.

Ingenuity. The degree to which creativeness, resourcefulness, inventiveness, and original or independent thinking are required in the position.

Administrative Responsibilities. A measure of the variety and complexity of administrative activities such as organizing, training, guiding, co-ordinating, and supervising personnel, and the number of persons supervised.

Keeping in mind the specific needs and problems of a company, a plan can be developed to cover positions of widely varying types and difficulty. In establishing the plan it is also important to provide factors which will lend themselves to consistent rating in the future even though the men performing the evaluation may be different. It is also essential to select a plan that is consistent with other existing job evaluation plans used by the company.

The actual evaluations of specific jobs within a company are performed by a committee usually assisted and coordinated by a company job evaluation expert or an outside consultant. The selection of the committee members will depend upon the use of men who understand company policy and history, men who understand over-all job relationships and men who understand job evaluation. Most important of all, though, is the selection of men with good analytical ability who can view jobs impartially in a systematic and scientific outlook. As a changing member of the committee, the supervisor of the position under study who knows the intimate job details and problems can be of great value in providing information about the job.

Continued support and maintenance of a sound job evaluation program for management and supervisory employees can bring about real benefits in companies in the paper industry, whether they be large or small. With the backbone of job evaluation and an effective wage structure, management effectiveness can be further enhanced by continued executive development and an incentive salary payment plan to compensate for superior performance.

Combating heat and humidity

DR. W. SCHWEISHEIMER

THE MANUFACTURE OF PULP and paper is not regarded as an unhealthful industry, although the high temperature and humidity of the workrooms lead to irritation of the skin, and excessive perspiration increases the suscpetibility of the skin to alkalis and other irritating substances encountered in the work.

Such is the conclusion in the recent edition of the book on occupational diseases of the skin by the well-known authors, Drs. L. Schwartz, L. Tulipan, and S. M. Peck. Heat and humidity still are some of the chief sources of health hazards to pulp and paper makers.

It's the humidity

The humidity in hot surroundings is particularly unpleasant to workers in the paper and pulp manufacturing industry. Whoever invented that old saying: "It's not the heat, it's the humidity," knew perfectly well what he was talking about.

In the removal of heat the evaporation of moisture from the skin plays an important part. The combination of high temperature and high air humidity is very uncomfortable because the humidity prevents evaporation from the skin as well as perspiration. In this way it does not allow the human body to release its surplus of heat through the natural ways.

Secretion of sweat is part of the heat-regulating mechanism of the body. Sweat is a weak solution of sodium chloride in water with traces of other salts. Perspiring at work makes imperative the drinking of an equal quantity of fluid in order to maintain the normal water content of the body and the vital "turgor" in the blood.

An industrial worker who is working in a heat-radiating atmosphere which is dry may still feel comfortable, since he can perspire freely and thereby give off heat freely. On the other hand, if the air of the room is hot and humid the surrounding air does not absorb the moisture his body gives off with the perspiration and he feels oppressed.

Some workers can tolerate more heat than others. Persons who are accustomed to cool climate or working in cool surroundings, suffer particularly when they are exposed to unusual heat. Even after acclimatization there are obvious differences between the individual workers. It may be necessary to assign certain tasks connected with heat and humidity to certain men who can tolerate them better. Contrary to popular belief, Negroes are much more susceptible to heat stroke than white people, two to six times more so. A colored worker, therefore, may suffer where a white worker gets along very well.

Combating high temperatures

Excessive temperature conditions have long been considered hazardous to health and, therefore, a concern of industrial hygiene. Some years ago Prof. C. P. Yaglou of Harvard University developed an "effective temperature index" which correlates the influences of temperature, humidity, and air motion. Recently a study of working conditions was made by Drs. John B. Skinner and W. M. Pierce, Division of Occupational Hygiene, Boston, Mass., in a number of plants where hot processes are employed during the summer months.

In all cases, heat production from the industrial operation was very great in comparison with the heat gained from sun rays. It was shown by the authors that in most "dry" processes the effective temperature did not exceed the permissible limit of 86° F. In the case of wet processes, however, only in one out of twelve studies conditions were acceptable. Work in the pulp and paper manufacturing industry belongs in part to the latter group.

Of the numerous methods suggested for combating high temperatures and their ill effects, ten have been encountered by Skinner and Pierce and are considered useful:

(1) Salt tablets have come into use quite extensively. Most plants use dispensers located adjacent to the drinking fountains. Others prefer to have the workers obtain them from the plant dispensary. Another method is the salting of the drinking water to a concentration of 0.1 per cent. Another salting mechanism involves an electrically operated device for introducing a known amount of salt into a mixing tank.

(2) To produce cooling air motion, circulating fans are in use. Reference to the "effective temperature chart" shows that an air movement of 200 f.p.m. will result in a drop of 1-2° below the "effective temperature" of still air. In one of the plants velocities as high as 500 f.p.m. were employed without complaint by the workers.

(3) An improvement of the foregoing method is that of general exhaust ventilation. This is limited to a certain extent by the locality. For those localities having "effective temperatures" of 84° or lower, considerable reduction of the heat load can be effected.

(4) In many cases the source of heat is concentrated over small areas. Here local exhausts hoods, properly insulated to prevent re-radiation, are the logical answer to the problem.

(5) Instead of exhaust ventilation it is sometimes desirable to provide supply air. It may be taken directly from outdoors or it may be cooled by water sprays. It is convenient to install the supply air pipes along the ceiling of the workroom where they are in contact with the hottest air. When a prohibitive amount of air must be introduced to the workroom in order to reduce the worker's exposure, the use of evaporating cooling systems will help when the humidity is low. In cases, when both exhaust and supply air equipment are used, it is sometimes erroneously believed that the ventilation rates of the two systems are additive.

(6) In the reduction of radiant heat suitable baffles can be installed between high temperature sources of heat and the workers. Radiation from furnaces, kilns, driers, etc., can be prevented by proper insulation.

(7) Any enclosed humid process is to be preferred to an open one from a health standpoint.

(8) Frequently, a considerable amount of hot surface can be insulated. Insulation of ventilation ducts both for heating and cooling is desirable in some cases.

(9) The adjustment of the working hours to avoid the hotter part of the day has some merit. It is the practice in a few plants to allow the men to go home at noon on days when the outside temperature rises much over 90° F.

(10) In two cases, water was sprayed on the roof to minimize the effect of sun heat gain and to reduce the temperature of the air near the ceiling.

As for personal protection of the workers, the problem of salt intake is less important than that of sufficient water. Dr. C. G. King warned that earlier reports of supposed benefits from extra salt were largely misinterpreted because the gains were caused chiefly by the increased water intake which the salt had caused. About 10 grams of salt per day, as supplied in ordinarily seasoned food, is adequate to meet one's needs for a long period. These observations stress the point that sufficient water has to be taken in on hot days which induces perspiration. Water is the main point.

Centrifugal Pumps

IGOR J. KARASSIK and ROY CARTER
Application Engineers, Worthington Corp.

Part 26 of a series
Installation

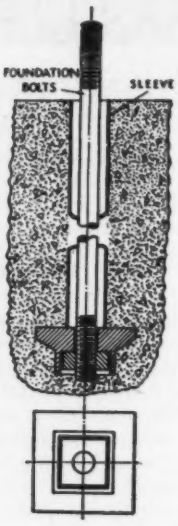


Fig. 1—(Left) Foundation bolts

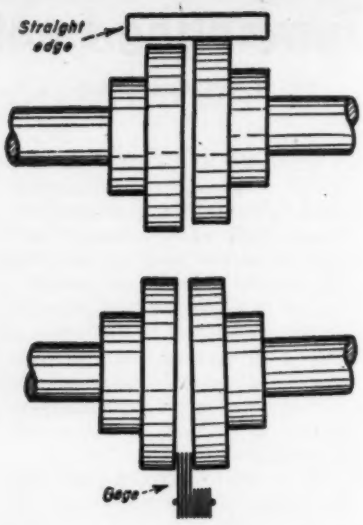


Fig. 2a and 2b—(Right) Coupling alignment

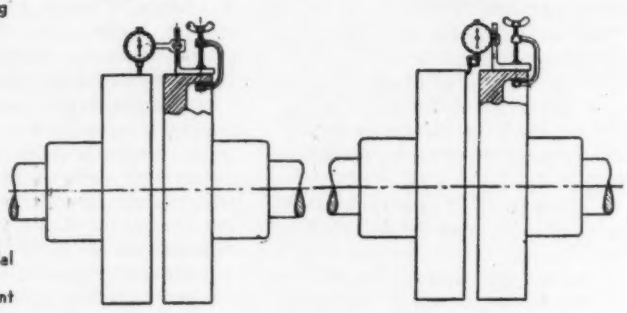


Fig. 3—Use of dial indicator for coupling alignment

THE INFORMATION contained in this article is necessarily general in character and should be supplemented by the specific instructions prepared by the manufacturer for the particular type of centrifugal pump the reader may have in mind. Manufacturers generally supply one or more sets of instruction booklets in the box of fittings which accompany the pump. It is of utmost importance that these booklets be placed in the hands of the personnel directly charged with the installation and operation of the pumping equipment, because satisfactory service can only be realized upon strict adherence to these instructions.

Preparation for shipment

After a pump has been assembled in the manufacturer's shop, the general procedure in its preparation for shipment is practically identical with all manufacturers. All flanges and exposed finished metal parts are cleaned of foreign matter and treated with an anti-corrosion compound such as grease, vaseline, or heavy oil. For protection during shipment and erection, all pipe flanges, pipe openings, and nozzles are protected by so-called service flanges made of wood or by screwed-in metal plugs, in order to prevent the entrance of dirt, dust, moisture, or other foreign matter.

Care of equipment prior to use

Immediately on receipt of the shipment, the equipment should be inspected and checked against the shipping manifest. Any damage or shortage should be reported to the transportation company's local agent.

The pumping equipment may be received on the site some time before it can be used. In such a case, it should be immediately stored in a dry location. The service flanges placed on the suction and discharge nozzles at the factory before shipment should remain attached to the pumps. Care should also be exercised in protecting the bearings and couplings against sand, grit or other foreign matter. Finally, in order to prevent rusting in or binding of the pump rotor, the latter should be turned over by hand at frequent intervals (at least once a day). Once in a while, a rotor will become slightly bound in storage. In order to free it, the thrust bearing should be removed or dismantled and oil throwers, guards or other parts which may restrict end-movement should be loosened. Moving the rotor a few times will free it at the wearing rings or wherever it has become bound at the internal clearances.

General rules as to pump location

(1) When pumps are placed indoors, studies should be made of the immediate surroundings which will affect accessibility. Pumps in poorly lighted and cramped locations or where dirt and moisture accumulate, are improperly placed for dismantling and repair, they will be neglected and both pump and driver may become damaged. Machines of this type should be placed in light, dry and clean locations.

(2) When pumping equipment must be used at levels where flooding is possible, two courses of action are possible: (a) a vertical wet pit type pump may be used, or (b) adequate provision, using auxiliary wet pit drainage pumps, must be made as an insurance against damage to the main equipment.

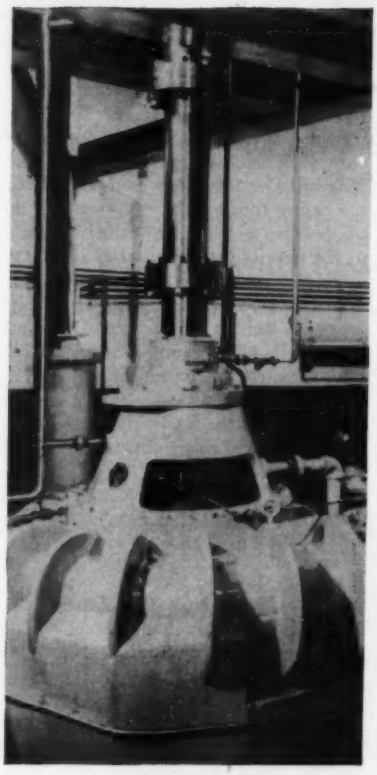
(3) If a motor driven unit must be operated in a damp, moist, or dusty location, this condition should be especially provided for the selection of the proper type of motor. Pumps and their drivers, when installed in the open, are specially constructed to withstand exposure to weather and are usually readily available for overhaul.

(4) In normal installations, pumps should be located as close as practicable to the source of liquid supply. When it can be conveniently done, the pump centerline should be placed below the level of the liquid in the suction reservoir. In all cases, one should be guided very strictly by the manufacturer's recommendations insofar as suction conditions are concerned.

(5) For most types of pumping units, more satisfactory service is obtained when rigid foundations are provided.

(6) Care must be exercised to provide sufficient room for dismantling the pump. This means that sufficient headroom must be allowed for horizontal pumps having axially-split casings so that the upper half of the casing may be lifted free of the rotor. Certain types of horizontal pumps are radially split and

Material from this article will be included in a book on centrifugal pumps now being prepared by the authors; hence, all rights to republication are reserved by the authors.



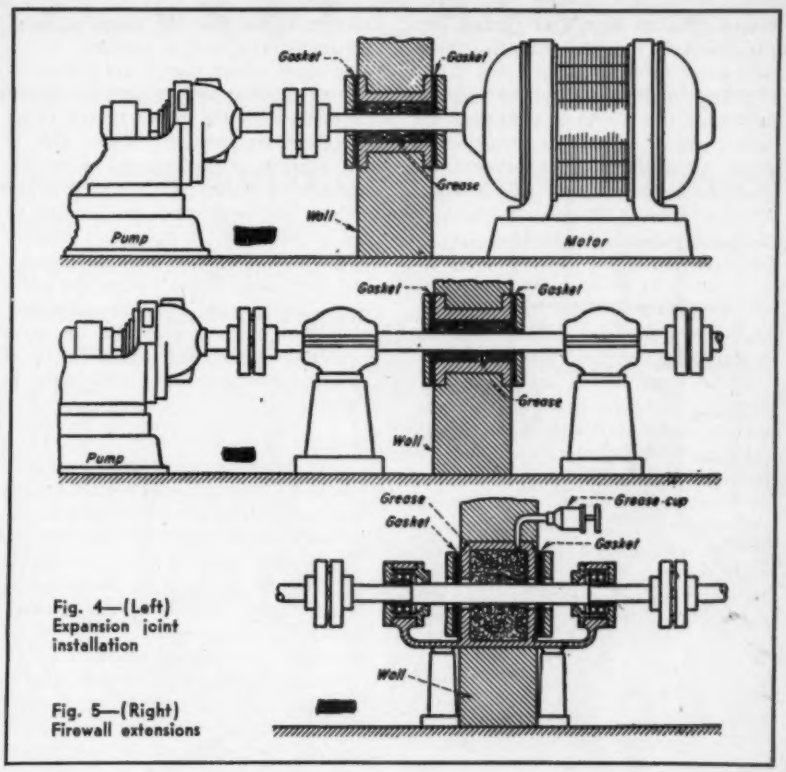


Fig. 4—(Left) Expansion joint installation

Fig. 5—(Right) Firewall extensions

their rotors are removed longitudinally. Space must be provided in such cases so that the rotor can be pulled out without canting it. For large pumps, with heavy casings and rotors, a travelling crane or facilities for attaching a hoist should be provided over the pump location.

Foundations

The foundations may consist of any structure sufficiently heavy to afford permanent rigid support to the full area of the baseplate and to absorb any normal amount of strains or shocks that may be encountered in service.

Concrete foundations built up from solid ground are the most satisfactory. In building the foundation, allowance should be made between the rough surface of the concrete and the underside of the baseplate for grouting.

The space required by the pumping unit and the location of the foundation bolts is determined from the certified drawings supplied by the manufacturer. The foundation bolts, of the specified size, should be surrounded by a pipe sleeve, three or four diameters larger than the bolt (Fig. 1). After the concrete foundations are poured, the pipe is held solidly in place while the bolt may be moved to conform to the corresponding hole in the baseplate.

When a unit is mounted on steel work or other structure, it should be placed directly over or as near as possible to the main members, beams and walls and be so supported that the baseplate cannot be distorted and alignment disturbed by any yielding or springing of the structure or of the baseplate.

Alignment

When a unit consisting of pump, base, coupling, and driver is assembled at the factory, the baseplate is placed on a flat, even surface, the pump and driver mounted on the base and the coupling halves accurately aligned. Shims are used under the pump and driver feet where necessary to provide such alignment. The pump is usually doweled to the baseplate at the factory. The driver is not doweled as this is best done after installation. The reason for this is that the base may be sprung in shipment or, if not sprung, may not be exactly positioned when mounted on its foundation. To reproduce factory alignment, a careful check is necessary in the field, because all baseplates are flexible and can be sprung out of shape.

Pumps are generally shipped mounted and it is usually unnecessary with units of moderate size to remove the pump or driver from its baseplate when leveling. The unit should be placed over the foundation, supported by short strips of steel plate or shim stock close to the foundation bolts, allowing a space from three quarters to two inches between the bottom of the baseplate and the top of the foundation for grouting. The shim stock should extend fully across the supporting edge of the baseplate. Remove the coupling bolts before proceeding with leveling of unit and alignment of the coupling halves.

Wedges are sometimes used instead of flat strips, although this practice is not recommended. If wedges are used, they should be removed after the grout has become partly set.

Employing a small spirit level, the projecting edges of pads supporting pump and driver feet, when scraped clean, can be used for leveling the baseplate. Where possible, it is preferable to place the level on some exposed part of the pump shaft, sleeve or planed surface of the casing. The steel supporting strips or shim stock under the baseplate should be adjusted till the pump shaft is level, the flanges of suction and discharge nozzles are vertical or horizontal as required and, at the same time, observe that the pump is at the specified height and location. When the baseplate has been leveled, the nuts or the foundation bolts should be made hand tight. While proceeding with the leveling of pump and base, it is important to maintain at the same time accurate alignment of the unbolted coupling halves between pump and driver shafts. Prior to alignment, the rotors of the pump and of its driver should be revolved by hand to insure that they revolve freely. A straight edge should be placed across the top and side of the coupling and the faces of the

coupling halves should be checked for parallelism by means of a tapered thickness gauge or feeler gauges (Fig. 2).

When the peripheries of the coupling halves are true circles of same diameter and the faces are flat, exact alignment exists when the distance between the faces is the same at all points and a straight-edge will lie squarely across the rims at any point. If the faces are not parallel, the thickness gauge or feelers will show a variation at different points. If one coupling is higher than the other, the amount may be determined by the straight-edge and feeler gauges.

It may sometimes occur, due to manufacturing tolerances, that coupling halves are not dead true circles and not identically the same diameter. In checking the trueness of either coupling half, it should be revolved, holding the other coupling half stationary and checking alignment at each quarter turn of the half being rotated. Next, the half previously held stationary should be revolved and similarly checked. A variation within manufacturing limits may be found in either of the half couplings and proper allowance for this must be made when aligning the unit.

The clearance between the faces of couplings of the pin and buffer type and the ends of shafts in other types should be set so that they cannot touch, rub, or exert a pull on either pump or driver. The amount of this clearance may vary with the size and type of coupling used. The best rule to follow is to allow sufficient clearance for unhampered endwise movement of the shaft of the driving element to the limit of its bearing clearance. On motor-driven units, the magnetic center of the motor will determine the running position of the motor half coupling. It is recommended that this position be checked by operating the motor while disconnected. At this time check also direction of rotation of motor. If current is not available, motor shaft can be moved in both directions as far as bearings will permit, then shaft adjusted centrally between these limits, thereafter assembling the unit with the correct gap between coupling halves.

Instead of a straight edge and feeler gauge, a dial indicator, bolted to the pump half of the coupling may be used to check both radial and axial alignment (Fig. 3). With the button resting on the other coupling periphery, the dial is set at zero and the coupling half chalk marked at the point where the button rests. For any check (top, bottom or sides) both shafts should be rotated by the same amount, i.e. all readings on the dial must be made with its button on the chalk mark. The dial readings will indicate whether the driver has to be raised or lowered or moved to either side. After any movement, it is necessary to check that the coupling faces remain parallel to one another.

In cases where pumps are driven by steam turbines, final alignment should be made with the driver heated to its operating temperature. Where this is not possible at the time of alignment, suitable allowance in the height of the turbine and shaft when cold should be made. Similarly, if the pump handles hot liquids, allowance must be made for the shaft being elevated when the pump expands. In any case the alignment should be checked when the unit is at operating temperature and adjusted as required before placing the pump in service.

Grout

The baseplate is ordinarily grouted before the piping connections are made and before the alignment of the coupling halves is finally rechecked. The purpose of grouting is not so much to take up irregularities in the foundations as to prevent lateral shifting of the baseplate as well as to increase the mass of the baseplate and reduce vibration.

The top of the rough concrete foundation should be well saturated with water before grouting. A wooden form is built around the outside of the baseplate to contain the grout. In some cases, this form is put tight against the lower outer edge of the base and, in other cases, is a slight distance removed from the edge. For convenience in getting the grout under the base, one or more funnels made of tin plate are used at several points around the edge. Grout is added until the entire space under the base is filled. The grout holes in the base serve as vents to allow the air to escape. A stiff wire should be used through the grout holes to work the grout and release any air pockets.

The grout should be protected against too rapid drying, to prevent cracking. This can be best accomplished by covering the exposed surfaces of the grout with burlap which is kept wet. When the grout is sufficiently set (about 48 hours), so that the forms may be removed, the exposed surfaces of the grout and foundation are finished to a smooth surface. When the grout is hard (72 hours or more), the holding down bolts should be finally tightened and the coupling halves rechecked for alignment.

Doweling of Pump and driver

The pump feet are usually doweled to the base at the factory. No dowels are fitted into the driver feet of factory assembled units. This permits movement of the driver during alignment, after which the driver should also be doweled.

It is generally recommended that when the pumping unit handles hot liquids, doweling of both the pump and its driver be delayed until the unit has been operated. In any event, a final recheck of alignment with coupling bolts removed and with pump and driver at operating temperatures is advisable before doweling.

Some special types of multistage pumps for handling very hot liquids are constructed with a key and keyway in the casing foot and base. Depending on the position of the trust bearing, one end of the pump is securely bolted while the other is bolted with spring washers under the nuts on the casing feet, allowing one end to move laterally when expanded. In general, all hot liquid multistage pumps should be doweled at the thrust bearing end, either in the ordinary manner or with the dowels crosswise. Dowels at the other end, if used, are fitted in a similar manner to the key and keyway, i.e. parallel to the pump shaft, so as to allow the casing to expand when heated.

Expansion joints

Expansion joints are used in the discharge and suction lines of centrifugal pumps to prevent transmission of piping strains to the pump. In many cases of pumps handling hot liquids, such expansion joints compensate for the change in dimensions due to expansion of the pump and piping.

In the installation of the high head (220 to 325 ft.) vetrical pumps shown in Fig. 4, a sleeve type flexible pipe connection was used on the downstream side of the cone type discharge valves, thus subjecting the valves, the pumps and the pipe fittings between them to a high hydraulic reaction. To transmit this reaction to the foundations, the 45° elbows were substantially anchored and, in addition, the pump casings were securely tied into the foundations by casting the concrete up around part of the pump casing as illustrated. On the largest, highest head pump this was still insufficient anchorage and the flexible pipe connection had to be replaced with flanged fittings.

Fire-wall extensions

When a pump handles an inflammable volatile liquid, such as gasoline, there is danger of an explosion unless the driver is of the explosion proof type. To avoid this risk it is frequently the practice to locate the pump and its driver in separate rooms, with a fire-wall between them. This requires the use of a shaft extension with a stuffing box so that the driver can be connected to the pump through the wall. Various types of fire-wall extensions have been used, some of which are shown on Fig. 5. These firewall extensions have a seal at each end, made of a close fitting felt gasket or of one or more rings of packing, followed by a gland. The space between the two seals is usually filled with a light grease to form a vapor-tight seal.

In the days before "calendering," **JOHN BASKERVILLE** famed British printer, type founder and paper-maker of the mid 18 century, got a smooth finish to his sheets by heating them while damp, and pressing them between plates of copper.

AS EARLY AS 1690 they tested for paper sizing by wetting the paper with the tongue. If the moisture penetrated the sheet, they figured there was not enough sizing.

Bathing Suits, practical for repeated use, have recently been made from paper especially treated with a new resin ingredient that increases the wet and dry tensile and bursting strength of the paper.

Odd Bits

Italian papermakers, it is said, first used watermarks in paper about **1270.**

The Paper Industry Association News

Mill Equipment Discussed at American Pulpwood Meeting

More than 100 industry representatives attended the two-day meeting of the Northeastern Technical Committee of the American Pulpwood Association, which was held in June at the Anchorage Hotel in Old Town, Maine.

The first day of the gathering was devoted to field trips to the operations of St. Regis Paper Co. and Penobscot Chemical Fibre Co. Observations were made of the following pieces of equipment in use: positive grapple control for power-operated cranes, P-M Cary-Lift unit with a special hydraulic rotating clam, standard P-M unit with a multiple tine fork, "C" Tournadozer, and an FWD rubber tired log skidder. Those participating were served a "river drivers style" lunch as guests of Penobscot.

The morning of the second day was devoted to the presentation of papers and discussions of the equipment observed during the field trip.

1954 Joint Coast Meeting

The Pacific Section of Tappi and the Pacific Coast Division of the Superintendents Association will stage a joint meeting May 20-21, 1954, at the Gearhart Hotel in Gearhart, Ore. The announcement was made by R. Burke Morden of Morden Machines Co. in Portland, who is secretary-treasurer of the Superintendents division.

Sixth Bolton Award Contest Winners Announced

Everett P. Ingalls, Jr. of S. D. Warren Co., Cumberland Mills, Maine, has been announced as winner of first prize in the sixth annual Bolton Award Contest. According to an announcement from the Superintendents Association, cash prizes totaling $3,250 have been presented to the three national winners and 10 divisional winners. The entrants submitted papers on the subject, "The Obligations of a Company to its Employees."

Second prize went to Charles F. Hill of Sorg Paper Co., Middletown, Ohio; while the third prize winner was J. H. Groves of Union Bag & Paper Corp., Savannah, Ga.

Divisional winners were as follows: *Miami Valley*—Lloyd E. Beck of The Mead Corp., Chillicothe, Ohio; *Michigan*—A. T. Luey of Sutherland Paper Co., Kalamazoo; *New York-Canadian*—Wilfred Galley of E. B. Eddy Co., Hull, Que.; *Northwestern*—John A. McPherson of Mosinee Paper Mills, Mosinee, Wis.; *Pennsylvania-New Jersey-Delaware*—Dr. A. L. M. Bixler of Riegel Paper Corp., Milford, N.J.; *Connecticut Valley*—Bemis P. Wood of Strathmore Paper Co., West Springfield, Mass.; *Southeastern*—W. E. Ryon, Jr. of Ecusta Paper Corp., Pisgah Forest, N.C.; *Pacific Coast*—Frederick H. Milligan of Crown Zellerbach Corp., Camas, Wash., (Mr. Milligan is now with the Pacific Mills Ltd. Division at Ocean Falls, B.C.); *Northeastern*—John E. Wilbur of S. D. Warren Co., Cumberland Mills, Maine, (Mr. Wilbur is now with Container Corp. in Chicago), and *Southern*—R. H. Worrell of Southland Paper Mills, Lufkin, Texas.

Industrial Bag & Cover Assn. Re-elects Davis

H. C. Davis of Bemis Bros. Bag Co. was re-elected president of the Industrial Bag & Cover Association at its third annual convention June 23-24 in Brockway Hot Springs, Lake Tahoe, Cal. Chosen for another term as vice president was Stanley Yount of Southland Paper Converting Co.

Five men elected to serve on the board of directors are as follows: Alvin A. Abramson, Central States Paper & Bag Co.; John Metzenberg, The Cromwell Paper Co.; Edward Look, The Portco Corp.; H. M. Hanson, Kennedy Car Liner & Bag Co., and Arnold Mills, Propack Inc.

Connecticut Valley Division of the Superintendents Association will hold its fall meeting October 10. Featured will be a mill visit to Rising Paper Co., Housatonic, Mass. A life membership certificate in the national association will be presented to Stephen W. Smith, general plant manager of New Haven Pulp & Board Co., New Haven, Conn.

Coming Events

TAPPI meetings

Sept. 23-24—Pacific Section, annual seminar, Seattle.

Sept. 25—Pacific Section, annual engineering meeting, Tacoma, Wash.

Sept. 28-29—Pacific Section, annual seminar, Portland, Ore.

Oct. 8-9—Tenth Fibrous Agricultural Residues Conference, Trenton, Ont.

Oct. 15-16—Third Corrugated Containers Conference, Statler Hotel, New York, N. Y.

Oct. 26-29—Eighth Engineering Conference, Sheraton-Mount Royal Hotel, Montreal

Nov. 3—Pacific Section, Longview, Wash.

Nov. 18-20—Seventh Alkaline Pulping Conference, Rice Hotel, Houston, Texas

Feb. 15-18—39th Annual Meeting, Commodore Hotel, New York, N. Y.

American Pulp & Paper Mill Superintendents Association meetings

Oct. 23-24—Pennsylvania-New Jersey-Delaware Division, Pocono Manor, Pocono Manor, Pa.

Oct. 28-30—Southern and Southeastern divisions (joint meeting), Edgewater Gulf Hotel, Edgewater Park, Miss.

Dec. 4-5—Pacific Coast Division, New Washington Hotel, Seattle

Other meetings

Oct. 3—CPPA, Pacific Coast Branch Technical Section, Devonshire Hotel, Vancouver, B. C.

Oct. 6-7—Fibrebox Association, fall meeting, Waldorf-Astoria Hotel, New York, N. Y.

Oct. 19-23—National Safety Congress, Pulp and Paper Section, Conrad Hilton Hotel, Chicago

Oct. 20-22—1953 Industrial Packaging and Materials Handling Exposition, sponsored by the Society of Industrial Packaging and Materials Handling Engineers, Boston

Oct. 27—Association of Consulting Chemists and Chemical Engineers, Hotel Belmont Plaza, New York, N. Y.

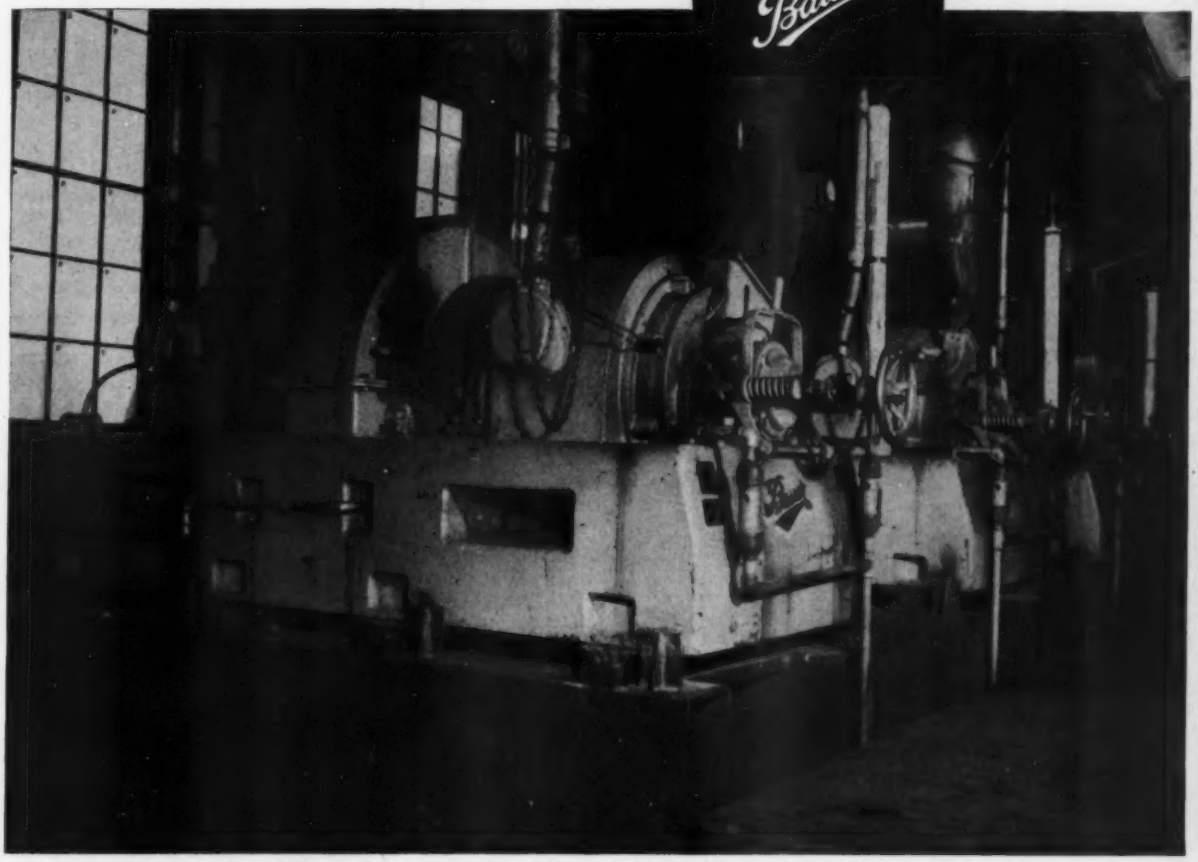
Nov. 4-6—National Paperboard Association, annual meeting, Waldorf-Astoria Hotel, New York, N. Y.

Dec. 6-8—Chemical Specialties Manufacturers Association Inc., 40th annual meeting, Mayflower Hotel, Washington, D. C.

Dec. 13-16—American Institute of Chemical Engineers, annual meeting, Hotel Jefferson, St. Louis, Mo.

Jan. 27-29—CPPA Technical Section, annual meeting, Sheraton-Mount Royal Hotel, Montreal

Veneer waste defiberized in Bauer Refiners



Shown in the above photograph are three Bauer No. 400 Refiners in the hardboard plant of The Coos Bay Lumber Company, Coos Bay, Oregon.

After log centers and veneer trimmings are chipped, the chips are steamed for 5 to 20 minutes. In due course, the semi-dry chips are fed into the Bauer refiners. Each refiner is equipped with two sets of discs rotating in opposite directions.

The rubbing action of the discs separates the chips into fibers. This is called "defiberizing" according to THE DICTIONARY OF PAPER—"The separation of fiber bundles into their individual fibers."

From the refiners the "pulp" goes to a blender where binders are added. Eventually, the fibers are fluffed and "snowed" down on a belt to a thickness of as much as six inches. A preliminary squeeze compresses the mat to permit sawing into sheets which are finally pressed into hardboard.

Of course, everyone in the pulp and paper industry recognizes the difference between the defiberizing of semi-dry chips and the refining of pulp slurry at 4% to 5% fluid consistency. Yet Bauer refiners are used with equal success for both processes, proving the adaptability of these versatile machines.

Further information on our refiners, both single and double revolving disc types, will be gladly furnished. You are invited to ask for our literature. Remember, too, that our research laboratory is available for testing the defiberizing, refining, reduction, or mullen development of any material in which you are interested.

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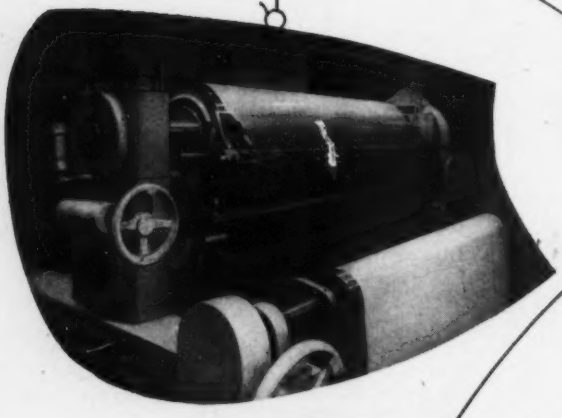
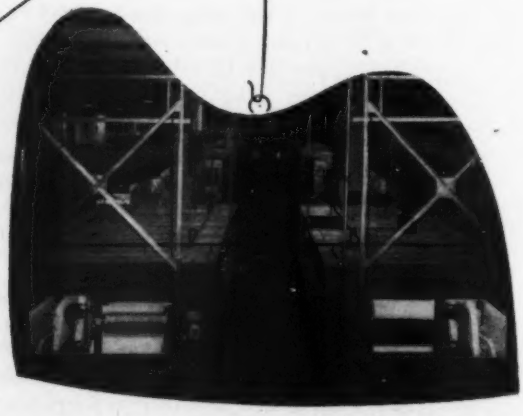


Treater

FOR LAMINATED PLASTICS INDUSTRY

The Formica Company, Cincinnati, O., has installed three Treaters in two of their plants.



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The Paper Industry Names in the News

Jacobs Heads Yeast Plant at Charmin Paper Mills

The appointment of *WALTER JACOBS* as yeast plant superintendent of Charmin Paper Mills Inc. (formerly Hoberg Paper Mills) of Green Bay, Wis., has been announced by J. M. Conway, president and general manager of the firm. Mr. Jacobs will be concerned with plant design and the selection of equipment that will be used in the Charmin torula yeast plant. He will serve as project engineer during plant construction and will later take charge of all production.

Since 1951 Mr. Jacobs had held a similar position with Lake States Yeast Corp., a subsidiary of Rhinelander Paper Co. Previously, he had been on the staff of the Sulphite Pulp Manufacturers Research League and was engineer-inspector during construction of the Lake States plant.

Walter Jacobs

Cola G. Parker

Cola G. Parker New K-C Board Chairman; Kimberly Elected President

COLA G. PARKER has been elected chairman of the board of Kimberly-Clark Corp., Neenah, Wis. He is being succeeded as president by *JOHN R. KIMBERLY*. The action was taken at a directors meeting August 19.

W. R. KELLETT, manufacturing vice president, was elected executive vice president to succeed Mr. Kimberly. And *F. S. SEABORNE* and *W. H. SWANSON* were named vice presidents of manufacturing and research and development respectively.

The executive realignment was undertaken in order to further a policy of decentralized operation by broadening the executive group and spreading responsibility. Under this policy, Mr. Parker as chairman of the board continues to function as chief executive and policy officer, and Mr. Kimberly becomes the corporation's chief administrative officer.

The office of board chairman has been unoccupied since the late F. J. Sensenbrenner left it in 1945. Mr. Parker moves into the position following 11 years as president and five as vice president.

Mr. Kimberly is only the fourth president of the company, which was founded in 1872, and the second Kimberly to hold the position. His grandfather, John Alfred Kimberly, one of the four founders of K-C, was the first president and served until his death in 1928.

The new president has been actively associated with the firm 27 years. He joined K-C after his graduation from the Massachusetts Institute of Technology in 1926. His early experience with Kimberly-Clark encompassed almost all departments of operation, from the mills in Neenah to the sulfite mill and engineering department at Niagara, Wis., and the paper mill operations at Kimberly. He came into the Neenah headquarters as assistant staff superintendent and for a time served as chief of central planning, which he organized.

Mr. Kimberly left his job as assistant general superintendent in 1942 to do a stint as a dollar-a-year man in Washington in the Office of Production Management and on the War Production Board, serving as assistant director general of WPB prior to his return to Neenah. From 1943 until his election as executive vice president in 1952, Mr. Kimberly was vice president in charge of sales.

Mr. Kellett, the new executive vice president, has spent his entire working lifetime—both before and after graduation from the University of Wisconsin—with the corporation. He "grew up" with K-C developments, from paper rugs and the beginnings of creped wadding manufacture and paper specialties to today's array of products. He was appointed manager of Kimberly-Clark mills in Neenah in 1937 and was transferred to the staff in 1943, becoming assistant general superintendent in that year and general superintendent in 1945. He was elected vice president of manufacturing in 1951.

Mr. Seaborne joined Kimberly-Clark in 1923, gaining early experience in the firm's Niagara Falls mill. He later assumed manufacturing responsibilities there and at other mills. During the war he was assistant general manager of K-C's ordnance division. He was named chief mill manager in 1947 and general superintendent in 1951.

An authority on pulping processes, Mr. Swanson completed 25 years with the firm in 1952. His election as assistant vice president in 1951 came with his appointment as director of research and development. Mr. Swanson joined K-C in 1927 upon graduation from the University of Minnesota and study in forest by-products there and at the University of Wisconsin. He also spent six years on the staff of the U.S. Forest Products Laboratory at Madison. Mr. Swanson recently returned from Sweden, where he attended the International Congress on Pure and Applied Chemistry.

Northern Promotions

Northern Paper Mills of Green Bay, Wis., has announced the promotion of three staff members.

JOHN E. GOODE, formerly assistant chief engineer, has been named to the newly created position of assistant general superintendent. He has been with the firm since 1947, serving first as project engineer. He is a graduate of Purdue University.

Named to succeed Mr. Goode as assistant chief engineer is *ROBERT L. COWLES JR.*, who joined the Northern engineering staff in 1948 shortly after graduation from Northwestern University. He was advanced to the position of master mechanic last year.

ROYAL ROBILLARD has been chosen to succeed Mr. Cowles as master mechanic, with responsibility over plant maintenance and the engineering shop. He is a 38-year veteran with Northern.

Ohio Boxboard Elects Maxon Executive Vice President

DUDLEY W. MAXON of Akron has been named executive vice president and general manager of The Ohio Boxboard Co., Rittman, Ohio. Mr. Maxon has been for 36 years associated with the law firm of Wise, Roetzel, Maxon, Kelly & Andress and has served Ohio Boxboard as legal advisor since 1933 and more recently as a director.

A graduate of Ohio State University, Mr. Maxon holds directorships in the

"NO MORE LUBRICATION TROUBLES"

—says STEPHENS-ADAMSON MFG. CO.
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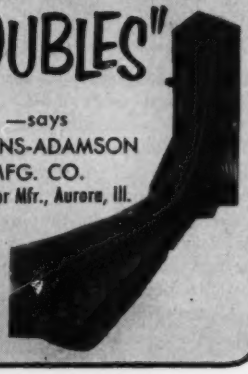

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following firms: Ohio Injector Co., Cleveland Crane & Engineering Co., Akron Savings & Loan, Akron First National Bank, McNeil Machine & Engineering Co., and Hardware & Supply Co. He is also vice president and director of Mayflower Hotel Co. and a past president of the Akron Chamber of Commerce.

Fort Orange Names Two VPs

ROBERT P. JONES and *LORENZ W. PETER* have been elected vice presidents of Fort Orange Paper Co., Castleton-on-Hudson, N.Y.

Mr. Jones will be in charge of sales of all the company's products, while Mr. Peter will continue as plant manager. Robert S. Harris, senior vice president and secretary, has been relieved of carton sales responsibility.

Other Fort Orange personnel appointments include *MARSHALL S. HANNOCK* as general superintendent; *ROBERT VAN BEUSICHEM* as assistant purchasing agent, and *JAY E. PAUL* as office manager.

Executive Change at Marathon

Several executive changes have been announced in the manufacturing division of Marathon Corp., Rothschild, Wis.

W. H. GRAEBNER, chief mill manager, has been named production manager of paper and pulp mills at Rothschild and Ashland, Wis.; Menominee, Mich., and Oswego, N.Y. He will eventually be responsible for manufacturing operations at Northern Paper Mills, Green Bay, which was recently merged with Marathon.

Other personnel changes are as follows: *HAROLD SPERKA*, staff assistant to the executive vice president in charge of manufacturing, has been given the position of manager of standards and graphic arts. *LEO C. HEROMAN* parafilm plant superintendent, assumes supervision of food packaging plants. *JOHN W. BARD*, superintendent of the Menasha paper mill and waxed paper plant printing operations, succeeds Mr. Sperka as manufacturing division staff assistant. Mr. Heroman's successor as parafilm plant superintendent is *ORRIN R. SCHEDER*, who was formerly superintendent of parafilm plant finishing operations in Menasha.

Cleminson Advanced by Abitibi Power & Paper

Appointment of *LES CLEMINSON* to the post of manager of new developments has been announced by D. W. Ambridge, president of Abitibi Power & Paper Co. Ltd., Toronto.

For the past two years, Mr. Cleminson has been general manager of the Cellulose Division of Alaska Pine & Cellulose Ltd., Abitibi's affiliated company on the West Coast. In his new position he succeeds Paul E. Roberts, who is now general manager of Alaska Pine at Vancouver.

From 1944 to 1950 Mr. Cleminson was assistant manager of mills for Abitibi in Toronto, and for nine years previously he was mill manager at Smooth Rock Falls, Ont. A Fellow of the Canadian Institute of Chemistry and a member of the Technical Section of CPPA, he is a Queen's University graduate of 1925.

Two St. Regis Top Executives Retire

St. Regis Paper Co. has announced that *WALTER DeLONG*, a vice president and director, and *WILLIAM H. ANDERS*, resident manager of the East Pepperell, Mass., mill, retired effective June 30. However, Mr. DeLong, who was resident manager of the firm's operations at Tacoma, Wash., will continue to serve in an advisory capacity.

Mr. Anders, who was formerly president of Nashua River Paper Co. at East Pepperell, became associated with St. Regis when it acquired Nashua in 1946. He will also continue in an advisory capacity.

Succeeding Mr. DeLong as resident manager will be *JACK M. LAMB*, who joined St. Regis in 1928 and who has been in charge of purchasing at Tacoma. *ROBERT DeLONG* has been named assistant to the resident manager at Tacoma in charge of wood procurement.

ROBERT A. CHASE has been appointed resident manager at the East Pepperell mill in succession to Mr. Anders, with *RUSSELL HAMILTON*, heretofore general superintendent, named mill manager. Mr. Chase will continue in charge of kraft sales in the New England area.

In another executive move, *FRED E. CHITTICK*, who joined St. Regis in 1943 and who has been in charge of woodlands and wood procurement for the company in the Northwest, also retired June 30. However, he too will continue to serve in an advisory capacity.

M. R. HAMARAT has been appointed manager of the Savannah, Ga., box plant of Union Bag & Paper Corp. Mr. Hamarat succeeds *O. C. FENTRESS*, who is being transferred to the sales development group of the board and corrugated container sales division.

Herman Whitmore, vice president in charge of boxboard operations at Robert Gair Co. Inc., has announced that *WILLIAM H. CADDOO* has been named his assistant, with the title of

assistant to the vice president. For three years Mr. Caddoo was division manager at the Thames River plant in New London, Conn.

HAROLD BOESCHENSTEIN, president and director of Owens-Corning Fiberglas Corp., has been elected to the board of directors of International Paper Co. He fills the vacancy created in May by the death of F. K. Morrow.

GEN. LUCIUS D. CLAY, former commander-in-chief of American forces in Europe and U.S. Military governor of Germany and now board chairman of Continental Can Co., has been elected a director of American Express Co.

Gen. Lucius Clay

J. M. Fulton

JOHN M. FULTON of Portland, Ore., has succeeded *D. J. GALEN* as administrative head of the purchasing department of Crown Zellerbach Corp. Mr. Fulton, who had been president of Pacific Coast Supply Co., holds the title of director of purchases. Mr. Galen, a C-Z vice president, has announced his decision to take optional earlier retirement, effective October 31, at which time he will have attained 45 years of active service.

VERNON L. TIPKA has been appointed vice president and director of St. Lawrence Paper Corp., Norfolk, N.Y. He was formerly assistant to the president.

RICHARD J. ZEAMER has joined the engineering department of Nekoosa-Edwards Paper Co., Port Edwards, Wis. A graduate of the Massachusetts Institute of Technology, Mr. Zeamer has been associated with Morton O. Tuttle Co., Boston paper mill builders; Bath Iron Works Corp., Bath, Maine, and Arpin Construction Co., Orange, N.J.

Election of *R. H. CHRISTIAN* as executive vice president and of *E. S. KIRKLAND* as secretary has been announced by Bathurst Power & Paper Co. Ltd. Mr. Christian has been secretary and treasurer of the firm since 1948 and will continue as treasurer. Mr. Kirkland was formerly assistant secretary.

(Top) Paper machine room and (Bottom) coating mill shipping area in the Hamilton, Ohio, mill of Champion Paper and Fibre Co. Both roof decks are built of Wolmanized lumber.

How Champion Paper protects its wood roof decks from rot

The Champion Paper and Fibre Company knew that the roof decking over its machine rooms was bound to be exposed to unusual moisture every day of the year. Ordinary wood would begin to decay in a few months where humidities are so high. So they installed Wolmanized pressure-treated lumber as roof decking over the machine rooms as well as in other sections of the mill.

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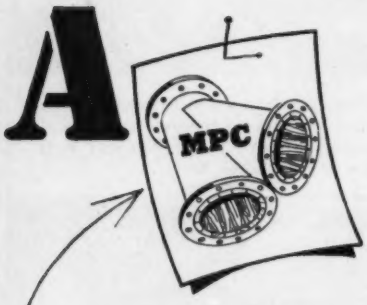

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The Paper Industry Necrology

Frank A. Johnson

Frank A. Johnson, 66, formerly general superintendent for Crocker-McElwain Co. in Holyoke, Mass., died July 27 in a Holyoke hospital. He had retired in June.

A native of Michigan, Mr. Johnson learned papermaking in Kalamazoo mills shortly after leaving high school. He was then associated with American Writing Paper Corp. at the old Norman Division in Holyoke, later returning to Kalamazoo as assistant general superintendent and later general superintendent of King Paper Co. Following 12 years with King, Mr. Johnson went to Sherman Paper Co. of Felts Mills, N.Y., as general superintendent, a post he held from 1925 to 1938, when he returned to Holyoke to become general superintendent for Crocker-McElwain.

Edward T. A. Coughlin

Edward T. A. Coughlin, a charter member of the Superintendents Association and its national president in 1925-26, died August 20 in a Kalamazoo, Mich., hospital following an emergency appendectomy. For the last three years Mr. Coughlin was chief of the Paper and Pulp Products Section, Research and Development Division of the Office of the Quartermaster General in Washington, D.C. He was 62.

A native of Holyoke, Mass., Mr. Coughlin was a chemical engineering graduate of the University of Maine. He entered the paper industry as a chemist with Monarch Paper Co. in Kalamazoo, later becoming superintendent of the firm's Coating Division.

He was subsequently technical director for Allied Paper Mills in Kalamazoo; general manager of Franklin Coated Paper Co., Franklin, Ohio; mill manager of New Jersey Coated Paper Co., Montclair, N.J.; paper advisor to W. F. Hall Printing Co., Chicago; director of research (paper and printing) for Pettingill Inc., Chicago, and service manager of Bryant Paper Co., Kalamazoo. More recently Mr. Coughlin was associated with Chas. T. Main Inc. of Boston.

First chairman (1919-21) of the Superintendents' Michigan Division, Mr. Coughlin as a member of the national executive committee organized the association's Western Board Division (later discontinued), the Connecticut Valley Division and the Southern Division. The Pennsylvania Division (now known as the Pennsylvania-New Jersey-Delaware Division) and the Southeastern Division were formed during his term as national president.

E. T. A. Coughlin

Dr. A. O. Jaeger

Dr. Alphons Otto Jaeger, 67, of American Cyanamid Co. died July 21. Dr. Jaeger held numerous patents, including a vanadium catalyst for sulfuric acid production and paper chemicals. He retired as chairman of American Cyanamid's development committee in 1951 but had remained with the firm in a consultant capacity.

Robert I. Wynne-Roberts

Robert I. Wynne-Roberts, 52, chief engineer for Finch, Pruyn & Co., died at his home in Glens Falls, N.Y., August 6 following a long illness. Mr. Wynne-Roberts first went to Glens Falls 25 years ago but later moved to Cohoes, where he was employed by Noble & Wood Machine Co. He had been with Finch, Pruyn since 1940. Mr. Wynne-Roberts was a native of Capetown, South Africa, and had received his chemical engineering degree from the University of Toronto.

J. Fred Wuenschel, retired district sales manager for Hammermill Paper Co., died at his Aberdeen, Wash., home July 21. He was 67.

Elmer Holmes Bartlett, 86, a member of the board of directors of Bird & Son inc., died in Norwood, Mass., July 22. He began his career with Bird as an office boy in 1885, later becoming head of the Special Papers Division and vice president and consultant.

James Murray Kahn, manager of the Pulp and Paper Division of Infilco Inc.

at Tucson, Ariz., died June 30. He was 50. Mr. Kahn had been associated with the firm 31 years and was widely known in the industry. He was a member of both Tappi and the Superintendents Association.

Olaf Jurgenson, 82, former chief engineer of Neenah Paper Co., died July 27 at his Neenah, Wis., home. A lifelong resident of the Wisconsin community, he had retired in 1945.

John Marshall, vice president and a director of Louisville Paper Co., died in Louisville July 31. Nationally known in the industry, he had celebrated his 50th anniversary with the firm in June. Mr. Marshall was a past president of the Central States Paper Trade Association and a member of the Purchasing Agents Association.

George S. Galib, sales office manager for F. C. Huyck & Sons, Rensselaer, N.Y., died August 4 in Albany. He was 37.

Harry S. Shorey, 76, for 20 years sulfite superintendent for International Paper Co., died August 11 in Corinth, N.Y.

Barrett C. Brookes, until his retirement last October assistant to the purchasing agent of Minnesota & Ontario Paper Co., died August 11 at Rochester, Minn. He was 68.

Charles J. Geilfuss, 53, assistant general manager of the General Asbestos and Rubber Division of Raybestos-Manhattan Inc. at North Charleston, S.C., died July 30 at his summer home.

Abner Baron, founder and president of Royal Paper Corp., New York, N.Y., manufacturers, converters and distributors of paper products, died June 27. He was 63.

Robert A. S. Bloomer, one of the cofounders of Bloomer Bros. Co., Newark, N.Y., died June 21 at the age of 82.

August Pischke, 86, who helped build the Nekoosa-Edwards Paper Co. plant and a retired employee of the firm, died in Nekoosa, Wis., June 28.

Herman E. Hansen, 46, director of purchases for Millprint Inc. at Milwaukee for the past three years, died June 23 at his home in that city.

Irving Fink, 64, president of Regal Paper Products Ltd., Toronto, died in Toronto General Hospital July 3. He had founded the Regal company four years ago.

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The Paper Industry Safety News

Six-Month Frequency Rate Up for International Northern Div.

THE AVERAGE FREQUENCY rate for International Paper Co.'s Northern Division during the first six months of 1953 was 5.51, up from the 4.75 recorded in the corresponding period of 1952. There were 28 lost-time injuries reported, as against 26 last year.

International has pointed out, however, that the number of man-hours of exposure is down about 400,000, accounting somewhat for the increased rate. And compared to the industry as a whole, the Northern Division's record is much better than average. The 1952 rate for the industry as reported by the National Safety Council was 10.06; the Bureau of Labor Statistics' figure for the year was 14.3.

The Tonawanda, N.Y., mill had the best record among the six in the division. Its frequency rate was reduced 80 per cent to 1.87. Next best was the Otis Division (Chisholm, Maine), where the rate was cut 50 per cent to 3.25. Experience at each of the six units showed rates of less than 8.00.

Injuries according to occupation

An analysis of injuries according to mill occupation for the first six months of 1953 shows that personnel in finishing and handling suffered the greatest number, with nine reported. This compares to five for the same period a year ago. Other injuries according to occupation were as follows: Paper machines, 6; repairs, 6; groundwood, 2; indoor miscellaneous, 2; outdoor miscellaneous, 2, and office and clerical, 1.

Breaks and fractures led in types of injuries with 9. Other types were: Cuts, bruises and lacerations, 5; hernia, 3; amputations, 2; sprains and strains, 2; eyes, 2; burns and scalds, 1; infections, 1, and miscellaneous, 3.

Falls to persons and falling objects led as the principal causes of accidents with seven each. Other causes were: Handling objects, 6; power working machinery, 1; manually operated machinery, 1; hoisting apparatus, 1; vehicles, 1; hot substances, 1, and miscellaneous, 3.

There were no fatal injuries at any of the six mills. In addition to Tonawanda and Otis, the division's frequency rate record by mill was as follows: Ticonderoga, N.Y., 5.40; Palmer, N.Y., 7.89; Niagara Falls, 6.79, and York Haven, Pa., 2.81. The total man-hours of exposure was 5,082,711.

Safety Notes

Combined Locks Paper Co.
has won first place among Class A industries in the safety contest sponsored by the Wisconsin Council of Safety. The firm had an acident rate of 1.48 in 1952.

Crossett Paper Mills
in Crossett, Ark., recently recorded its millionth man-hour without a lost-time accident.

NSC Pulp, Paper Meetings Set for October 19-23

Pulp and paper industry safety experts from throughout the country will gather in Chicago October 19-23 for the annual meeting of the Pulp and Paper Section of the National Safety Congress. The sessions will be held at the Conrad Hilton Hotel.

Keynote speaker at the opening session will be D. C. Everest, chairman of the board of Marathon Corp., Rothschild, Wis. His topic will be "Forty Years Progress in Safety."

Another feature of the initial meeting will be the presentation of the Edward Benton Fritz Trophy, which is given annually to the mill having the most outstanding safety record for the previous year. In charge of the ceremony will be A. Scott Dowd, publisher of THE PAPER INDUSTRY, donor of the trophy.

The annual luncheon will be highlighted by an address by Mayor Jimmy Arrington of Collins, Miss. Presiding will be G. J. Bienvenu, general superintendent of the Container Division of Gaylord Container Corp., Bogalusa, La.

PI Contest Report for Six Months Shows 11% Decrease from 1952

COMPARED TO the identical 1952 period, the six-month report of the NSC Paper Industry Safety Contest shows an 11 per cent drop in the accident frequency rate for all divisions. According to an announcement from the National Safety Council, 94 contestants have maintained perfect scores in the January-June period. This compares to more than 100 last year.

The June frequency rate for all divisions was 7.89, while that for the first six months was 8.25. In the pulp and paper division the June rate was 7.41, that for the first half 7.61, down 17 per cent from last year. In paper converting the six-month rate was 10.01, up 4 per cent from 1952.

There is a total of 464 participants in the 1953 competition, 384 of whom reported in June. For the first half the 94 contestants with perfect scores were as follows:

Division I—Pulp and Paper Mills

Group A
St. Regis Paper Co., Kalamazoo, Mich.
Quebec North Shore Paper Co., Baie Comeau, Que.
The E. B. Eddy Co., Hull, Que.

Group B
Crossett Paper Mills, Crossett, Ark.
Brunswick Pulp & Paper Co., Brunswick, Ga.
Publishers' Paper Co., Oregon City, Ore.
Marinette Paper Co., Marinette, Wis.
Gaspesia Sulphite Co. Ltd., Chandler, Que.

Group C
Schmidt & Ault Paper Co., York, Pa.
Manitoba Paper Co. Ltd., Pine Falls, Man.
Crystal Tissue Co., Middletown, Ohio
The Mead Corp., Sylva, N. C.
Central Fibre Products Co., Quincy, Ill.
Congoleum-Nairn Inc., Cedarhurst, Md.

Group D
Fraser Companies Ltd., Newcastle, N. B.
Certain-Teed Products Corp., York, Pa.
Certain-Teed Products Corp., East St. Louis, Ill.
Johns-Manville Corp., Pittsburgh, Cal.
Container Corp. of America, Los Angeles
Hollingsworth & Vose Co., West Groton, Mass.
The Bartgis Bros. Co., Ilchester, Md.
The Mead Corp., Harriman, Tenn.
National Container Corp., Ontonagon, Mich.
Container Corp., of America, Circleville, Ohio
Crown Zellerbach Corp., Lebanon, Ore.
New York & Pennsylvania Co. Inc., Willsboro, N. Y.
Central Fibre Products Co., Tama, Iowa
U. S. Gypsum Co., Oakmont, Pa.
Marathon Corp., Ashland, Wis.
Strathmore Paper Co., Mill No. 1, Woronoco, Mass.
The Mead Corp., Columbian Division, Bristol, Va.
Lloyd A. Fry Roofing Co., Summit, Ill.
Manistique Pulp & Paper Co., Manistique, Mich.
Lloyd A. Fry Roofing Co., Irving, Texas

National Gypsum Co., Kalamazoo, Mich.
The Mead Corp., Nashville, Tenn.
Canadian Johns-Manville Co. Ltd., Asbestos, Que.
Lloyd A. Fry Roofing Co., Houston, Tex.
Spaulding Fibre Co. Inc., Milotn, N. H.
Lloyd A. Fry Roofing Co., Jacksonville, Fla.
Container Corp. of America, Chattanooga, Tenn.
National Gypsum Co., Pryor, Okla.
The Flintkote Co., Mt. Carmel, Ill.
The Logan-Long Co., Franklin, Ohio
Lloyd A. Fry Roofing Co., Brookville, Ind.
Riegel Paper Corp., Hughesville, N. J.
Container Corp. of America, Wlimington, Del.
St. Regis Paper Co., Watertown, N. Y.
Johns-Manville Corp., Tilton, N. H.
Riegel Paper Corp., Riegelsville, N. J.
Volney Felt Mills Inc., Fulton, N. Y.
International Paper Co., Riley, Maine
American Writing Paper Corp., Mount Tom Division, Holyoke, Mass.
International Paper Co., Livermore Falls, Maine
The Logan-Long Co., Amalgamated Roofing Mills Division, Chicago
Spaulding Fibre Co. Inc., North Rochester, N. H.
Dexter Sulphite Pulp & Paper Co., Dexter, N. Y.

Division II—Paper Converting

Paper Bags

St. Regis Paper Co., San Leandro, Cal.
Thilmany Pulp & Paper Co., Kaukauna, Wis.
St. Regis Paper Co. Ltd., Vancouver, B. C.
St. Regis Paper Co., Playa Ponce, Puerto Rico

Boxes and Cartons

Group A

Marathon Corp., Wausau, Wis.
Container Corp. of America, Medford, Mass.
Container Corp. of America, Los Angeles
Container Corp. of America, Folding Division, Manyunk, Philadelphia
Stone Container Corp., Chicago
Fort Wayne Corrugated Paper Co., Chicago

Group B

Conatiner Corp. of America, Baltimore
Container Corp. of America, Knoxville, Tenn.
Gaylord Container Corp., Tampa, Fla.
Container Corp. of America, Greensboro, N. C.
Container Corp. of America, Los Angeles
Container Corp. of America, Sixth Street, Philadelphia
Hankins Container Co., Chicago
Green Bay Box Co., Green Bay, Wis.
Bay West Paper Co., Green Bay, Wis.

Roofing Paper

The Flintkote Co., East Rutherford, N. J.
The Ruberoid Co., Joliet, Ill.
Certain-Teed Products Corp., Dallas
Johns-Manville Corp., Los Angeles
Lloyd A. Fry Roofing Co., York, Pa.
Lloyd A. Fry Roofing Co., South Kearny, N. J.
Lloyd A. Fry Roofing Co., Robertson, Mo.
Lloyd A. Fry Roofing Co., Minneapolis

Insulation and Building Board

The Flintkote Co., Meridan, Conn.
Armstrong Cork Co., Macon, Ga.
Minnesota & Ontario Paper Co., Insulite Division, International Falls, Minn.

Specialties

Lily-Tulip Cup Corp., Augusta, Ga.
Sealright Co. Inc., Kansas City, Kan.
Lily-Tulip Cup Corp., Chicago
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Lily-Tulip Cup Corp., Galva, Ill.

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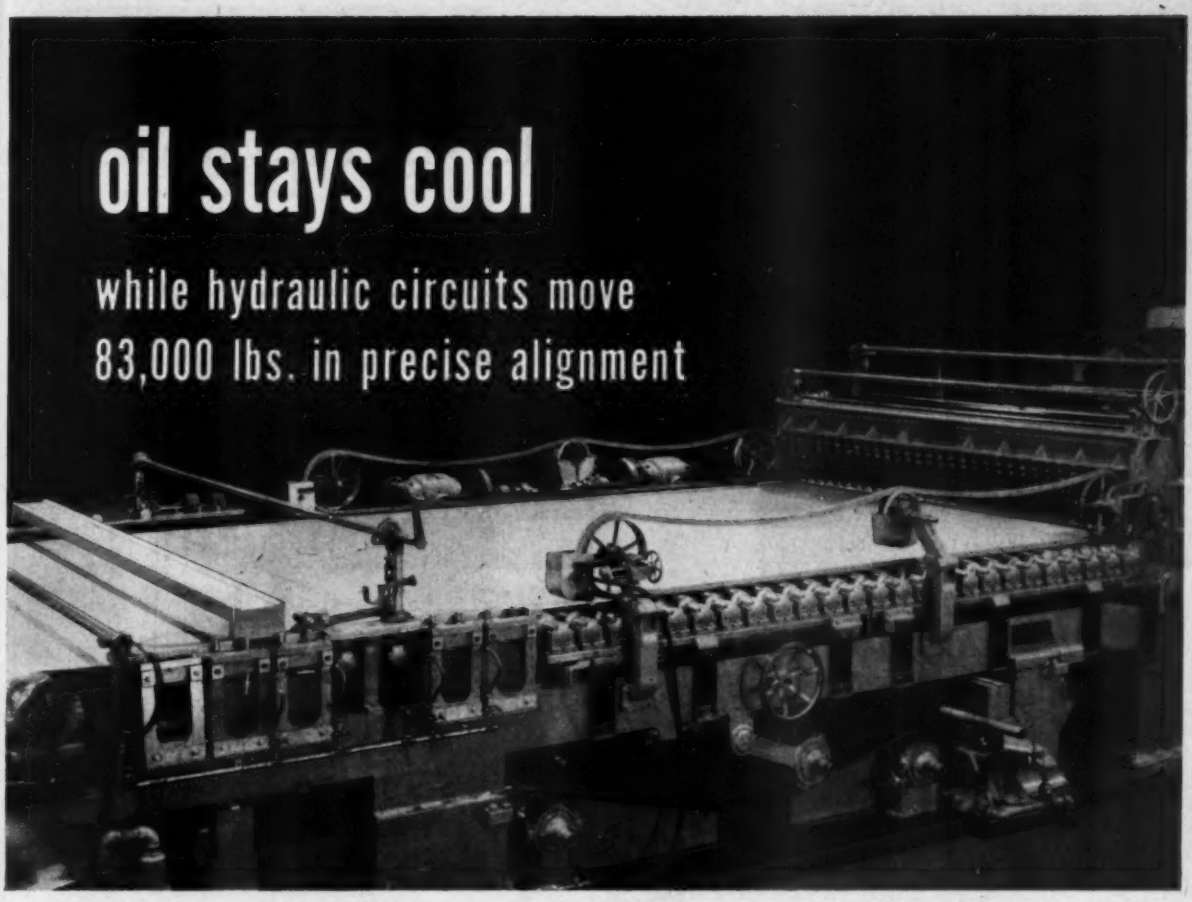
Safety Contest Regrouping Approved by Committee

The National Safety Council has announced a regrouping of contestants competing in Group D of the Paper Mills Division of the Paper Industry Safety Contest.

Because of the large number of mills in this size group, it has been deemed advisable to create a new section—Group E. Group D now includes contestants operating an average of 21,226 to 42,500 man-hours per month, while Group E includes mills operating 6,000 to 21,226 man-hours monthly.

The regrouping was undertaken with the approval of the contest committee.

Kimberly-Clark Corp.'s No. 1 mill at Niagara Falls, N.Y., has recorded its 1,000,000th man-hour without a lost-time accident. The 422 production, engineering, and technical workers involved recently celebrated the completion of one working year without a disabling injury.



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The Paper Industry Patent Reviews

MELVIN NORD*

Paper stock pulper

U.S. 2,641,971, issued June 16, 1953, to Enright A. Ellis, and assigned to Downingtown Manufacturing Co., describes apparatus for pulping and extracting material used in the manufacture of paper. The principal features claimed by the inventor are the fiber liberating action of the apparatus, and the absence of dead spots for the accumulation of material.

As shown in Figs. 1 and 3, the apparatus consists of a vertical tank 1, the side walls of which have three concave lobes or flutes 3. The tank is provided with a flat bottom 4 and a sub-bottom 5, a clean-out plug 5a being provided for cleaning out the space between the bottom members. The bottom 4 contains a large circular opening 6, within which is mounted the plate 7 of an impeller 8 which contains two sets of blades 9 and 10. The lower parts of the lobes 3 are provided with openings 14 through which the treated fibrous material is extracted. Surrounding this, there is a cylindrical housing 15 which receives the treated stock. From here, the treated stock enters a standpipe 24 which is divided diametrically by a partition 25 over which the stock flows, passing down the other side of the standpipe to the intake of a suitable stock refiner 26 driven by a motor 27. By regulating the height of the dam, the rate of extraction of the stock may be controlled so that the pulper may be operated and stock fed to it and extracted as a continuous

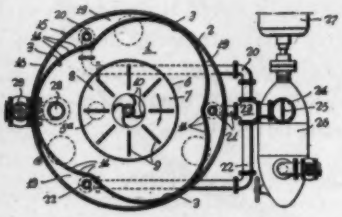
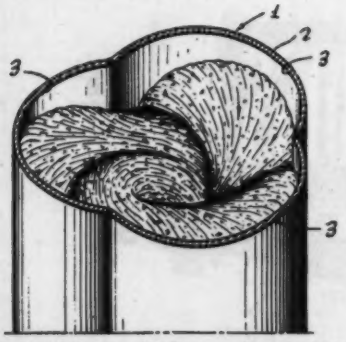
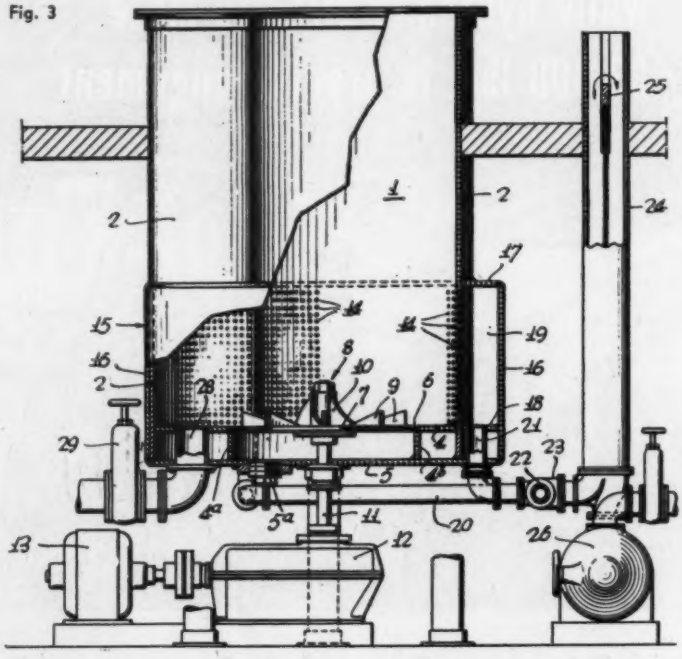


Fig. 1 above; Fig. 2 below



*Patent Attorney, 664 Putnam, Detroit, Mich.

Fig. 3



Other Patents of Interest to the Paper Industry

Subject	*Inventor or Assignee*	*Patent No.*	*Date*
Machine for making paper boxes	Henry Russell Davis, Jr.	2,641,973	6/16/53
Paper backing adapted for manufacture of waterproof sandpaper	The Carborundum Co.	2,642,349	"
Process of making fiberboard from groundwood	Armstrong Cork Co.	2,642,359	"
Manufacture of wet strength paper	Union Carbide & Carbon Corp.	2,642,360	"
Control of paper refining machinery	The Black-Clawson Co.	2,642,781	6/23/53
Fiberboard forming press with loader and unloader	Chapman Forest Utilization, Inc.	2,642,782	"
Machine for making paper containers	National Paper Bottle Co., Inc.	2,642,784-5	"
Log debarker and chipper	John H. Pearce	2,642,904	"
Deaerating a paper stock suspension	The Rotaread Corp.	2,642,950	"
Apparatus for the transportation of pulpwood	Hyster Co.	2,643,012	"
Steam heated drying rolls for wet pulp webs	E. I. du Pont de Nemours & Co.	2,643,099	"
Production of artificial board from cellulose fibers	Chapman Forest Utilization, Inc.	2,643,186	"
Treatment of wood fiberboards with olefinic polymer oil	Standard Oil Development Co.	2,643,200	"
Screen apparatus for screening paper-making stock	Julius J. Colvin	2,643,586	6/30/53
Apparatus for breaking lumps in a wet paper web	The Sandy Hill Iron & Brass Works	2,643,587	"
Method of making cartons and carton blanks	Robert Gair Co., Inc.	2,643,589	"
Machine for assembling paperboard partitions	Robert Gair Co., Inc.	2,643,590	"
Automatic means for making special cardboard containers	Leo D. Overland and Jack W. Levine	2,643,591	"
Carton forming machine	La Cellophane	2,643,592	"
Method of producing multiply metal foil-cardboard material	The New Merton Board Mills, Ltd.	2,643,593	"
Hydraulic log debarker	Worthington Corp.	2,643,691	"
Web-splitting machine with minutely variable cutting-roll equipment	Max Schneider	2,643,719	"

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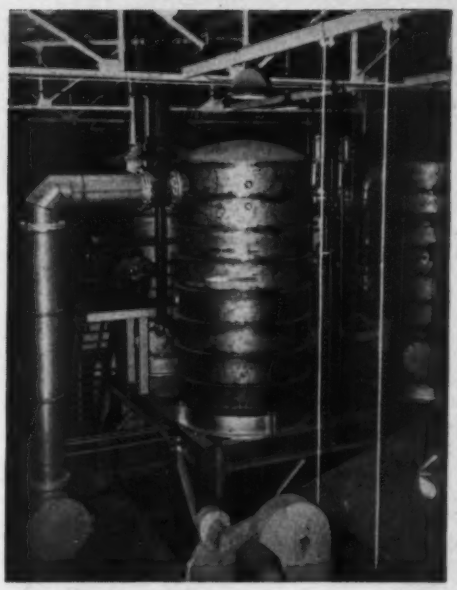
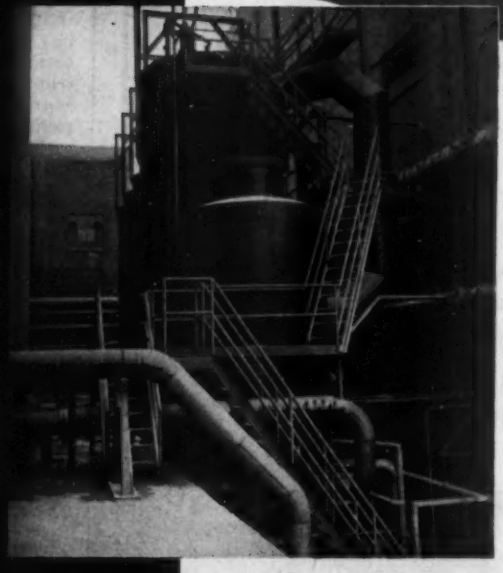


FOR WASTE SULPHITE LIQUOR—Conkey Flat Plate Evaporator with Rosenblad Switching System is noted for continuous evaporation of sulphite pulp mill waste liquors. Self-cleansing action washes away accumulated scale by condensate wash of *all* parts, making possible continuous capacity operation.



FOR BLACK LIQUOR—Conkey Long Tube Film Type Evaporator is widely used for waste liquors whose concentration does not require mechanical cleaning of heating surfaces for scale removal. Provides a net positive gain in evaporation by reducing pressure drop losses between effects.

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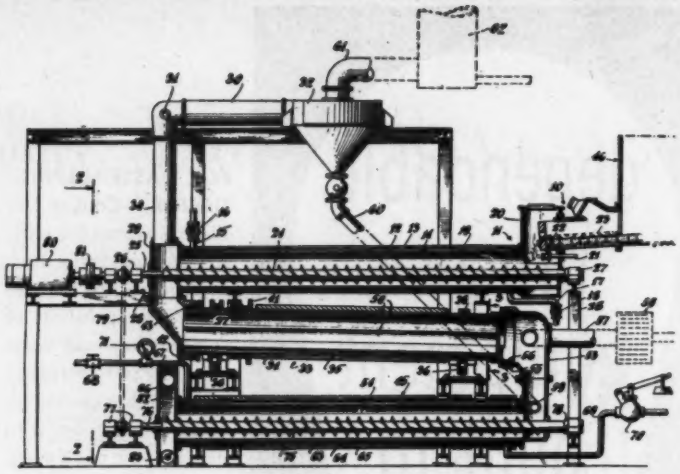
process with control of the time of treatment.

The type of agitating action which occurs is shown in Fig. 2.

Conversion of sodium sulfide from spent cooking liquors to sodium sulfite

Stream pollution can be avoided in the sulfite pulp industry, and the sulfur content of the spent liquors can be converted to sodium sulfite by oxidation, according to John E. Greenawalt in U.S. 2,642,336, issued June 16, 1953. (Apparatus for process is shown in illustration at right.)

The spent sulfite cooking liquor is first concentrated to 60 per cent or more solids, by evaporation of water. The concentrated liquor is then burned in a suitable furnace under reducing conditions to convert the sulfur compounds to the corresponding



sulfide. In this way, sodium sulfide in dry form is produced from the spent cooking liquor. It is then cooled and pulverized and the sodium sulfide is then treated in an oxidizing atmosphere, without the addition of water, to convert the sulfide to sulfite. The oxidation is done with air, with as little as 1 or 2 per cent of thiosulfate being formed, while the amount of sulfite produced may be as much as 50 to 60 per cent, the remainder being substantially all sodium carbonate.

The vital feature of the reaction is the continuous removal of the heat of reaction, so as to maintain a temperature not in excess of 250°C. If this is not done, the oxidation proceeds to sodium sulfate instead of sulfite. Control is obtained by using steam under pressure in a jacket around the oxidation chamber. Controlling the steam pressure regulates the temperature.

The molten sodium sulfide (produced in the manner described above) enters the apparatus through a spout 10, which leads into a cooling chamber 11. This chamber consists of an elongated water jacketed cylinder. A jet of steam is thrown onto the entering material through a nozzle 21, cooling the mass and disintegrating it. The cooling chamber is also provided with a screw conveyor 24. The sodium sulfide is cooled and broken up as it passes through the cooling chamber. It then drops into a rod mill 33, where it is finely pulverized. Preheated air is introduced through a conduit 57, in order to oxidize the sodium sulfide as it is being progressively pulverized and as it passes through the rod mill. The pulverized material then falls into the oxidizing chamber 54. The air stream passes through a dust collector 61, solids being returned by line 60 to the entrance to the oxidizing chamber.

The oxidizing chamber is steam jacketed and contains a screw conveyor 75. The solid product finally leaves through a discharge port 83. Preheated air is admitted through a conduit 86 at the discharge end of the oxidizing chamber. The air is not permitted to enter the cooling chamber, but is exhausted by a fan 31 just after it leaves the rod mill. Until the sodium sulfide has been cooled to about 150°C. it is highly combustible; it is protected by non-oxidizing gases drawn from the black liquor furnace 46 by the exhausting fan 31.

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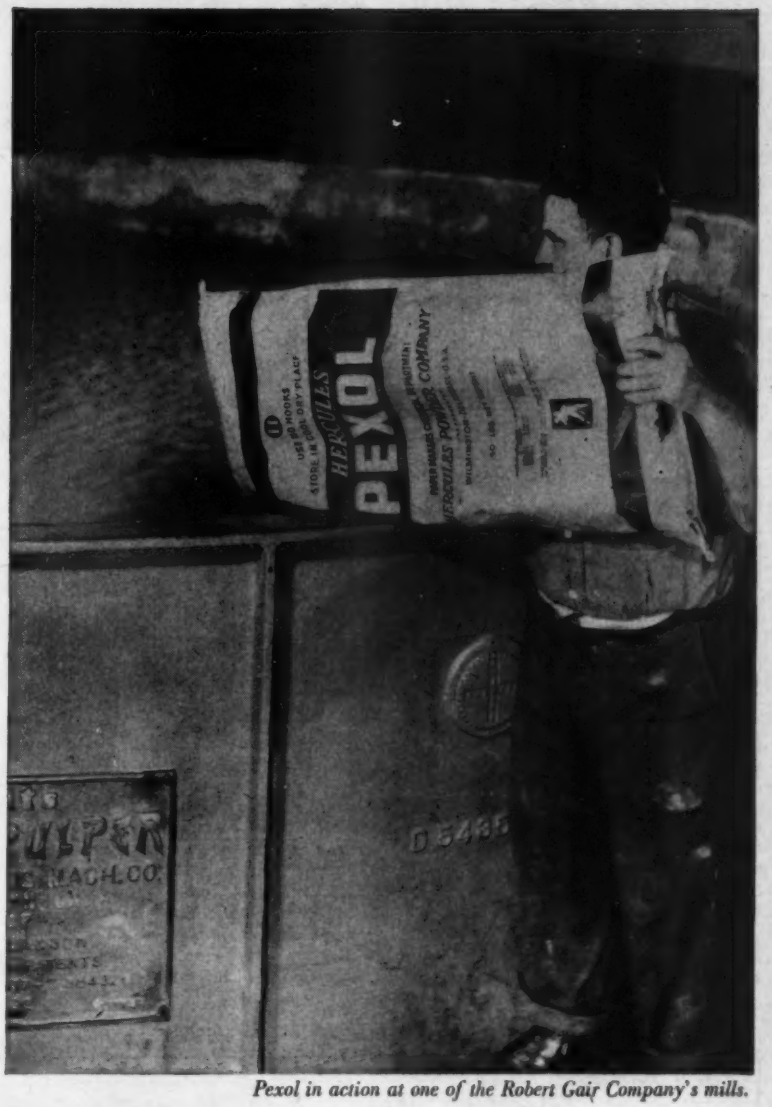

Pexol in action at one of the Robert Gair Company's mills.

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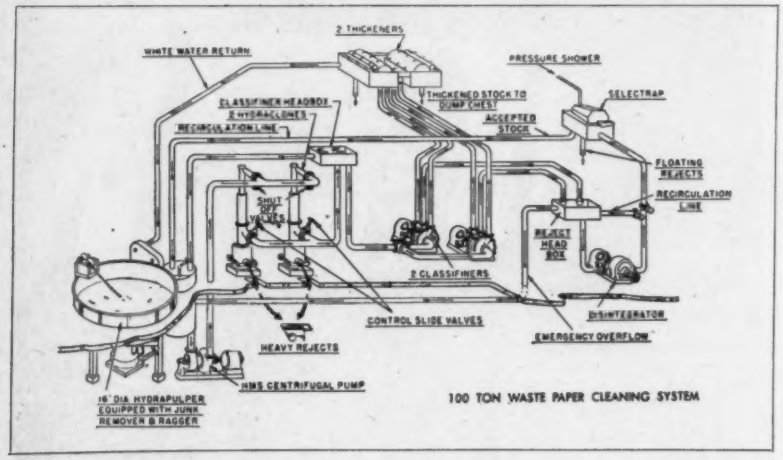
Foreign Abstracts



100 TON WASTE PAPER CLEANING SYSTEM

Preparing, cleaning and treating waste paper

The object, which is described in great detail, is to treat the waste paper in such fashion that it can be reused for paper or paperboard manufacture. Twenty-four illustrations and one table (which is included in the present abstract) are given.

Before treating the paper in refiners or in jordans, it is important to separate as much dirt as possible. This saves later needless power consumption. The impurities which may find their way into waste paper are of two general types: those which are much heavier than water (such as metal, stones, sand, etc.) and the so-called "floating trash" which has a specific gravity less than or about the same as that of water (such as rags, rope, cord, wet-strength papers, etc.). Although in many mills some of these more obvious impurities are removed by hand, a wet cleaning system has been developed which is based on removal of the two general types of foreign material. A series of steps is used in the disintegration, slushing and cleaning of the paper taken from the bales, and most of these are shown in logical sequence in the table. Following the removal of the gross impurities, the usable fibers are recovered, concentrated and thickened. The entire operation is also shown schematically in the accompanying figure.

Equipment, the type and operation of which are fully described, includes apron-type conveyors, Hydrapulpers, raggers, junk removers, Classifiners, jordans and high-speed refiners. In the case of the Hydrafiners, emphasis is placed on their rapidly declining efficiency when certain precautions are not taken, an efficiency which depends on the type of stock. Centralized panels serve in controlling the operations. Graphs show the development (or loss) in pulp strength in Hydrafiners and in the jordans. The former develop tear and, to a more limited extent, burst and tensile strength; and in them the drop in freeness is very low. The jordans, on the other hand, cause a marked rise in Mullen and tensile strengths, whereas there is a marked drop in tear and in freeness. Actually, these differences illustrate the characteristic influences of speed vs. horsepower. The Hydrafiners which run at low horsepower, but at high speeds, have a brushing and fibrillating but very little cutting action. The jordans, which require high horsepower and are run at low speed, give rise to a cutting action. The importance of proper agitation in waste paper mills is also discussed and emphasized. F. Madsen. *Svensk Papperstidn.*, **56**, 338-350 (1953). (In English.)

Steps in Mixed Waste Paper Low Density Slushing and Cleaning Systems

Type of Operation	*Consistency*	*Equipment*	*Comments*
Feeding of furnish	Dry	Belt conveyor or Skip hoist	Continuous Automatic
Initial disintegration	1½%-2½%	Breaker beaters, pulpers	Temp. 25-60° C. Continuous.
Removal of large heavy particles	—	Junk removers or Junk box	Junk removed by buckets or by hand
Removal of Rags, Ropes, Wires, etc.	—	Rag catcher or Automatic ragger	Batch or Continuous operating
Primary Removal of heavy dirt	0.6%-1.2%	Rifflers, Settling cones, Centrifugal pressure drop equipment	Continuous
Coarse Screening of Floating Trash	0.8%-1.5%	Vibrating screens or Classifiner	Continuous. Tailings for fiber recovery
Disintegration of Floating Trash for Fiber recovery	1.5%-2%	Non-cutting—brushing type of Refiner Disintegrator	Continuous
Final screening of Floating Trash. Recovery of Fibers	1%-2%	Flat or rotating screens—Selectrap	Continuous
Concentration of accepted fibers	Inlet :0.8%-1.5% Discharge: 4%-6%	Drum Concentrators, Thickeners or Vacuum Washers	Continuous
Final Disintegration or defibering	3%-6%	Beaters and/or conical high speed refiners and Jordans	Batch or Continuous. Direct to machine or blending chest or headbox
Final dirt removal	0.8%-1.2%	Rifflers or Centrifugal Pressure drop equipment	Generally ahead of paper machine
Final Screening	0.8% to 1.2%	Flat or Rotary open or closed screens	Generally ahead of paper machine

Materials used for construction in the Australian kraft pulp and paper industry

This is the comprehensive report made by a group of metallurgists working in the pulp, paper and board mills of the Australian Paper Manufacturers, Ltd. Their studies extend over a period of 11 years. The corrosive action of a large variety of typical mill liquors on various steels, cast iron, Monel metal, copper, a variety of bronzes, on lead, etc., is listed, with corrosion rates given in terms of grams per square meter per 24 hours. The greatest corrosive action is manifested by the bleach liquors.

Galvanic corrosion and the corrosion of paper machine MG cylinders are also studied. After a series of metallurgical tests have been made, specifications are developed for driers of board machines.

Studies are also made of construction materials used in the stacks of recovery furnaces. Stacks lined with a cement high in alumina appear to be quite resistant, al-

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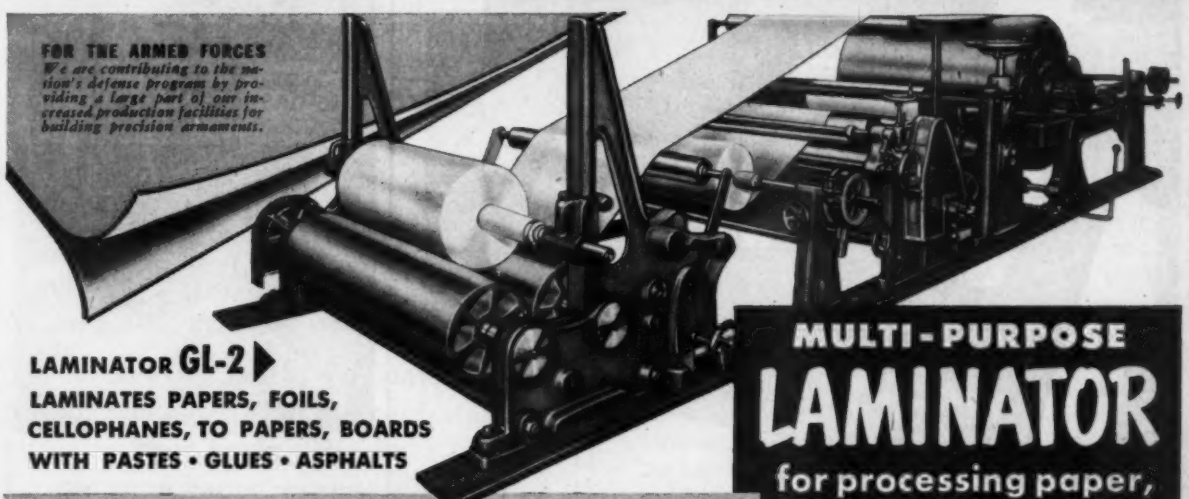

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THE all-purpose GL-2 Laminator uses materials direct from parent rolls and rewinds, after laminating with either hot or cold glues and pastes. The machine is so designed that each operating assembly can be readily changed to handle the ever-growing list of new laminants and materials. Completely flexible, it can be rearranged for longer sheet leads . . . new assemblies added . . . or old ones subtracted. Standard 60-inch unit has one hot or cold dryer and is equipped with paste or glue applicator. An asphalt applicator may also be added. Provisions are made for by-passing the sheet so that either of the two applicators can be used with equal facility. Additional drying units can be added to speed production by faster sheet curing if desired. Similar laminators are made for use with wax, crystalines and hot melts. Rewinders and backstands of various types can be furnished. Write for complete details and specifications.

though perhaps the best (but much too costly) stack construction involves a reinforced concrete shell, lined with a bituminous membrane, faced with resistant bricks and acid-proof mortar.

An excellent description is also given of the factors influencing the wear of Fourdrinier wires. An apparatus is devised (and fully described) to determine the rate of wear of warp knuckles of bronze wire brought into contact with various materials, in the presence of dilute acid (pH 4.5) at 30°C. Such materials include 17 woods, several metals, and various plastic blocks. The least damaging material is probably "Northern silky oak."

Metallurgical studies are also made of refiner discs, machine knives and piping used in paper mills. The author discusses protection against corrosion quite fully. W. T. White. *Australian Pulp and Paper Ind. Tech. Assoc. Proceedings*, 1952, 149-176; discussion, pp. 176-79.

Factors influencing the creasing of paperboard

This is a communication from the Graphic Arts Research Laboratory in Stockholm. After giving a survey of the literature, the authors define the term "creasing" with special reference to those variables that may have a marked influence on the bending of board. A method is described for the dynamic measurement of the compressibility of paper and board, and the apparatus is shown in Fig. 1.

The visco-elastic properties, together with compressibility, are deemed to be of major importance in obtaining "ideal" creasing; and this hypothesis is confirmed experimentally. Besides extensibility and compressibility (in the middle layers), humidity and folding endurance are also of importance. Creasing does not appear to be well correlated with stiffness, tensile or burst. Different boards require different pressures to insure satisfactory creasing, but such pressures cannot be too high; the greater the board thickness, the higher the

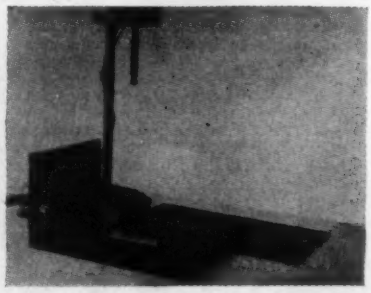


Figure 1

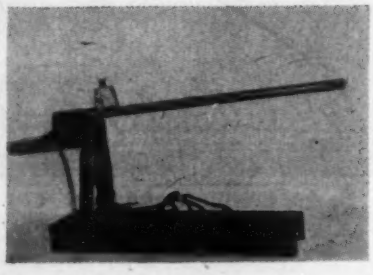


Figure 2

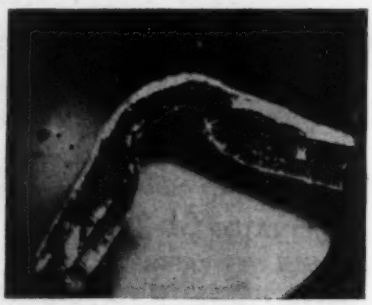
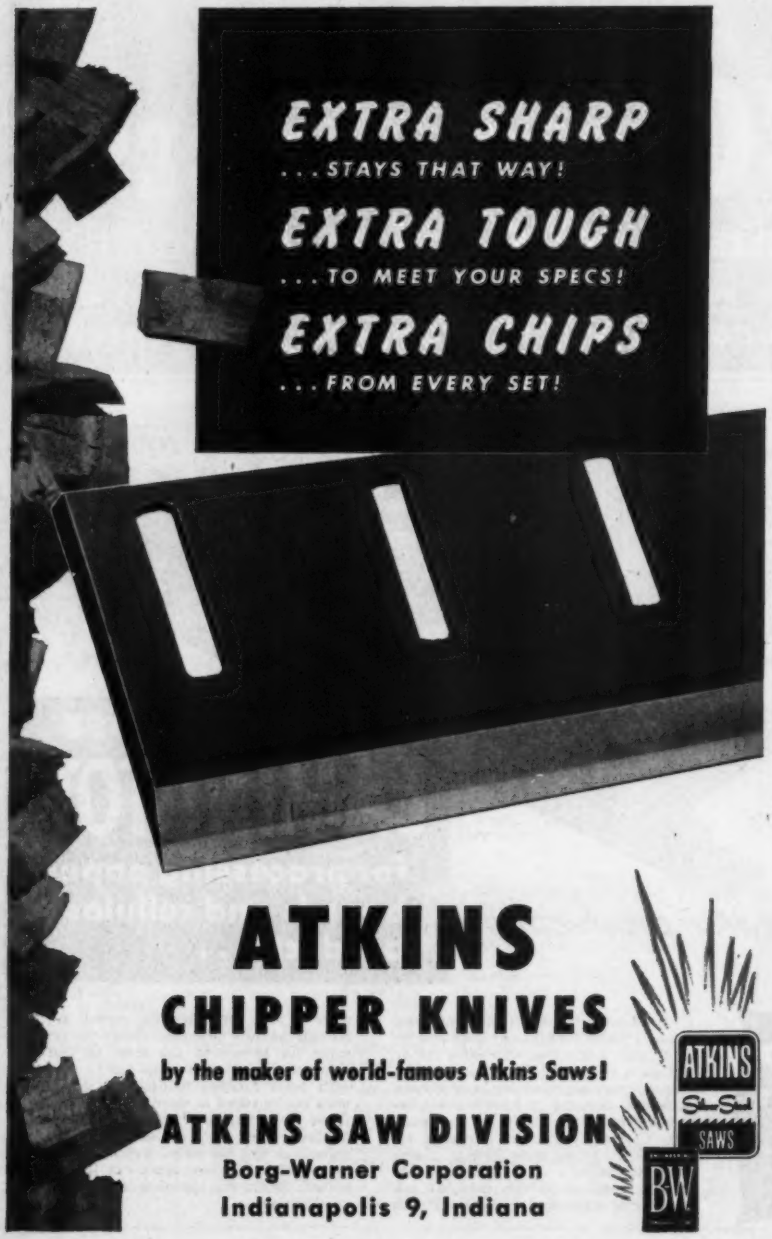
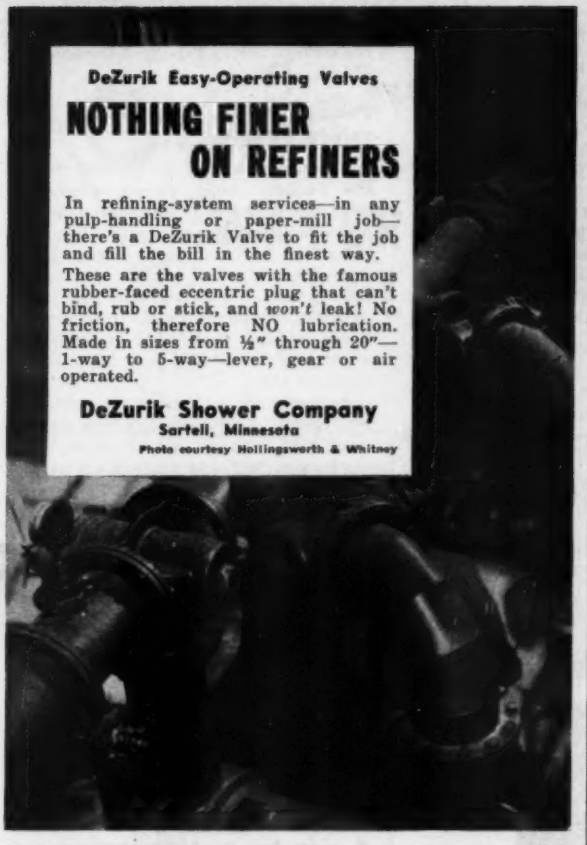


Figure 3

Figure 4





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pressure required. Up to a point, increase in the moisture content improves creasability. The "scoring devices" used are also of importance; those with rounded edges give satisfactory results, whereas those with sharp edges do not.

Fig. 2 shows the apparatus devised by the laboratory in their studies on creasing. Fig. 3 shows in cross section a photomicrograph of a compressible board ideally creased. The cracks and ruptures resulting from a less-compressible sample are shown in Fig. 4. The experiments are carried out with the help of variance analyses. Hans Olav Brynhildsen, Ingemar Olsson and Lennart Pihl. *Svensk Papperstidn.*, **56**, 328-337 (1953). (Original in Norwegian, with a brief English summary.)

Yacca resin as a sizing agent

Methods are given for the isolation of yacca resin (I) from various species of *Xanthorrhoea;* the various properties of the resin are described. When dissolved in a cold solution of sodium hydroxide, I reacts with alum and can be used as a paper sizing agent. Apparently, it is about 80 per cent as effective as rosin in conferring water-resistant properties to paper. The size cannot be kept indefinitely because it undergoes gradual hydrolysis; and owing to its dark color, its use is restricted, in the main, to such papers as kraft wrappings.

Comparative data for rosin and for I, covering sizing properties and sheet strength properties are given. H. A. Reid. *Australian Pulp and Paper Ind. Tech. Assoc. Proceedings,* 1952, 231-39; discussion, pp. 239-42.

Fodder yeast from spent sulfite liquor

This is a paper from the Institute of General Biology, Lublin, Poland, which also deals with potato pulp fermentation, but the present abstract treats only with sulfite spent liquor (I). Inasmuch as the original I contains SO_2 and other volatiles that inhibit yeast growth, I is treated with slaked lime to pH 10, the precipitate discarded, and the liquor acidified to pH 4.5. Evidently, the addition of humic acid to I improves the yields of yeast.

Fermentations are carried out over a 12-hour period by the constant-flow method, using a 35 l. reactor and 0.6 cu. m. of air per hour at 30°C and a pH of 4.3-5.1. For every 100 g. of sugar present, 5.2 g. nitrogen and 3.8 g. P_2O_5 are introduced as nutrients. The yeast is centrifuged and dried *in vacuo*. Fermentations are carried out both with *Saccharomyces cerevisiae* (II) and *Torula utilis* (III), and the yields of yeast are compared with those obtained from molasses used as a control. Although the yields are lower in the case of spent liquor than from molasses, they are reasonably satisfactory. II contains 7.5-8 per cent nitrogen and 4.5-4.6 per cent P_2O_5. III contains 8.9-9.5 per cent nitrogen and 5.6-6.5 per cent P_2O_5. S. Bujak. *Acta Microbiol. Pol.*, **1**, No. 1, 65-87 (1952), through *Chemical Abstracts*, **47**, 7157-8 (1953).

Researches in 1952-1953 at the University Abo Akademi

This is a very brief progress report given by the Professor of Chemistry and Chemical Technology of Forest Products at the University at Abo, Finland. Part of this work has already been abstracted more fully in The PAPER INDUSTRY. (See page 664.)

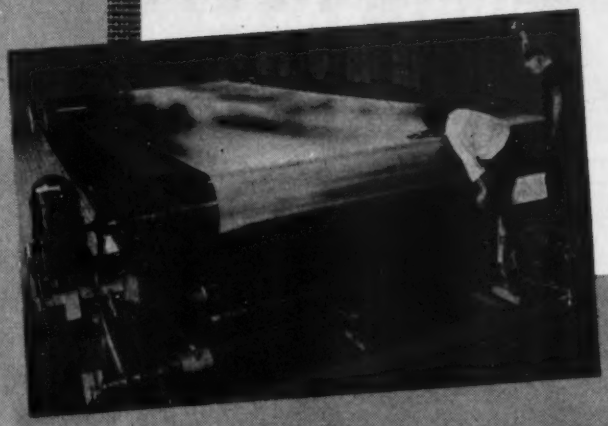
Experiments show that birch kraft pulp loses in strength when the viscosity drops below 35-40 centipoises. Dissolving pulps are formed satisfactorily, both from spruce and birch, bleached by chlorination and one-stage alkali washing. The properties are shown in the following table.

	Spruce	Birch
Yield, %	43.0	40.7
Viscosity, cp.,	29.3	30.5
Alpha cellulose, %	89.9	90.9
Pentosans in original pulp, %	2.8	10.5
Pentosans in isolated alpha cellulose, %	0.3	0.8

The penetration of sulfite cooking liquor into chips from spruce and from birchwood is studied in a series of parallel experiments and laboratory digestions. Experiments are carried out with various rosin samples, showing the connection between chemical composition and paper sizing. Suberin studies are continued.

Fusel oil investigations (described elsewhere) are also continued. Products from the fusel oil include fractions boiling at 15 mm. and 143°C., at 15 mm. and 162°, and at 4 mm. and 160°. These have not been identified but seem to be aromatic and appear to emanate from lignin. Waldemar Jensen. *Paper and Timber*, **35**, (Special Issue), No. 4a, 155-6 (1953). (In Finnish, with an English summary.)

Two of the Men Behind Eastwood Wires



FINAL EXAM

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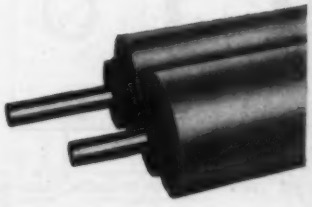
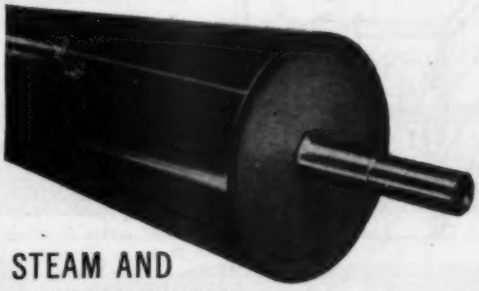
Solid wood wet felt rolls 4" to 9" diameter. Kiln-dried wood rolls 4" to 12" diameter. Rubber, brass, steel, aluminum and stainless steel felt rolls.





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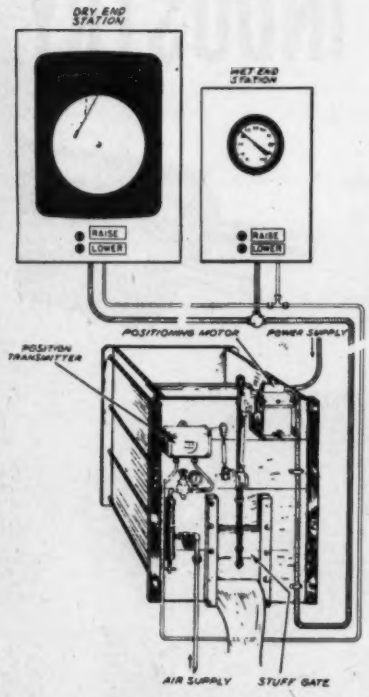


Stuff gate positioning system

A new system of stuff gate positioning gives the paper machine crew closer control of basis weight. By simplifying manual stuff gate adjustments, the system is said to cut operating time, produce a higher quality finished sheet and reduce the expense of heavy stock.

Remote positioning equipment consists of a waterproof motor and a position transmitter at the stuff gates and control stations at the wet and dry ends of the paper machine. A receiver recorder at the dry end station charts a continuous record of gate position received from the pneumatic position transmitter. By energizing one of the two push buttons on the instrument panel, the operator can raise or lower the gate, adjusting the flow of stock according to the basis weight desired. The same functions can be performed at the wet end station, except that an indicating gauge instead of a recorder shows stuff gate position. *Foxboro Co., Foxboro, Mass.*

Pallet roller

The new lightweight Ace Stevedore King pallet roller for moving a loaded pallet forward or backward has the following constructional features: "King size" rolls are heavy gauge, large diameter, and have crowned ends for free rolling and floor protection. Bearings are heavy duty and fully lubricated. The frame is constructed of high tensile strength steel, fully welded. Equalizer design retains parallelism and alignment of frame under all conditions. Bearing area of the frame is large for heavy loaded pallets and load protection. Dead large hexagon axles are cotter-keyed in the frame for easy service. The frame contains hexagon holes to prevent axles from turning. *Frank L. Robinson Co., Latham Square Bldg., Oakland 12, Calif.*

Titration curve assembly

A titration curve assembly that uses a popular pH-meter to assist chemists in setting up controls on any variety of samples is now available. The shape of the various curves plus the indicated end-points supply all the answers. Thus, impurities impress their "fingerprints" on the curve, where they are readily identified by eye.

The titration assembly includes a burette stand with burette holder, two burettes with curved delivering tips, an electrode support, and a 250 ml. beaker. Heart of the assembly is a new magnetic stirrer, equipped with two stirring magnets, one polyethylene, one glass-enclosed, which operates on 115 v. 50-60 cycles ac. Brain of the assembly is a Beckman pH-meter.

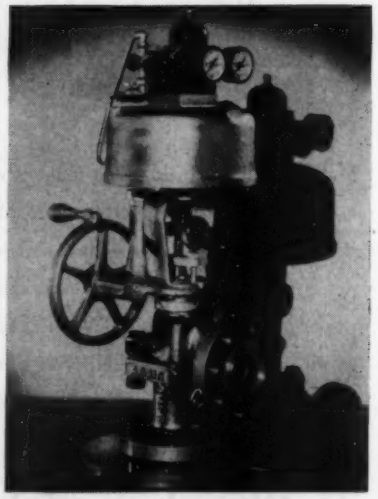
Assembly One is built around the Beckman H-2, the temperature-compensated, direct-reading pH-meter that can be operated for 24-hour periods without harm to the instrument. Assembly Two is built around the portable, battery-operated Beckman N-1 pH-meter. A set of titration curve accessories alone is also available. *Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa.*

Electric industrial truck

Factory and warehouse aisles half their present width have been made possible by development of a compact electric powered stacker that can tier goods 11 ft. high in aisles only 6 ft. wide. The new materials handling unit, called the Transveyor, is for use where narrow aisles, close quarters, and limited floor or elevator capacity are factors.

Company engineers report that the Transveyor is the only battery-powered industrial truck in its field with four wheels having three-point suspension. This provides balanced action, which automatically equalizes the load on both front wheels regardless of floor conditions.

The basic model of the Transveyor handles 2,500 lb., 48-in. long loads. There are two mast heights: 68 in. and 83 in. The former provides 102½ in. of telescopic lift and the latter, 132½ in. Other models are available to handle equally long loads weighing up to 4,000 lb. The Transveyor is available in either telescopic or non-telescopic versions. *Automatic Transportation Co., 149 West 87th St., Chicago 20, Ill.*



Automatic and manual control valve

A new combination automatic and manual control valve, Models 1520 SMW and 1560 SMW, utilizing the advantages of their powerful Domotor control unit, in addition to the versatility of Handwheel operation, is now available.

A major application of the auxiliary manual control is in adjusting the flow of steam to turbines or steam engines and fuel to engines. It is also used when batches are being processed intermittently. Some operators use the manual control when adjusting fuel consumption for arriving at maximum engine efficiency. The Handwheel may also be used as an adjustable limit stop for the automatic control valve plug.

The automatic operating principle of the Domotor valve employs a sealed piston which is actuated by internal pressures, combined with a built-in null-type positioner for more powerful and positive valve action, with positioning accuracy up to 1/1000 of valve travel. *Annin Co., 3500 Union Pacific Ave., Los Angeles 23, Calif.*

Ratchet-lever hoist

A new coil-chain ratchet-lever hoist, known as Model R, introduces many new convenience and safety features, according to the manufacturer.

Use of coil instead of roller chain in the new model is said to permit the chain to swing or wrap easily in any direction. When not under load, it may be pulled freely through the hoist head for quick adjustment. The new Model R also gives added advantages in operation and servicing, according to the manufacturer. The handle operates in any position, which solves the problem of working in cramped quarters or where there is little head room.

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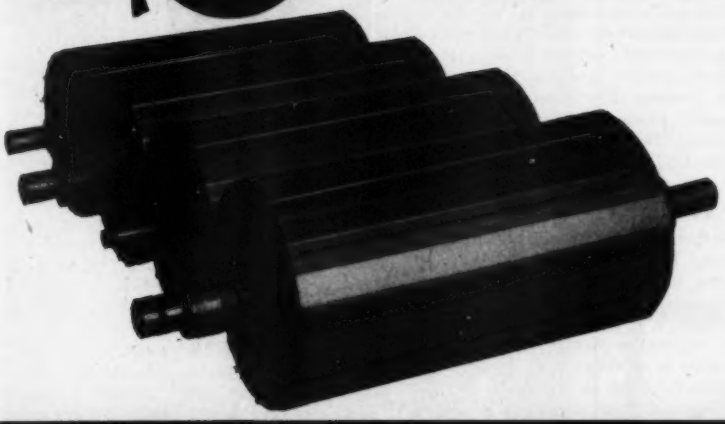

With new, corrosion-resistant Monel covers, the rolls are more efficient than before, for Monel guards against acid attack indefinitely . . . outlasts cast iron many times . . . saves the cost of new cores . . . eliminates frequent regrinding.

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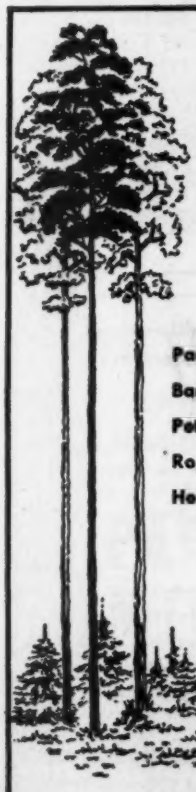

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Also, the handle can be operated with either partial or full strokes, depending upon space limitations and desire of the operator. Safety stops prevent spinning of the handle.

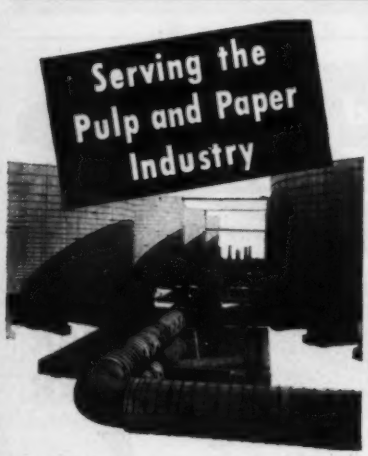
The hoist has few parts and can be completely disassembled in seconds with only a screwdriver, according to the manufacturer. All load-holding parts are said to be designed to withstand a pull equal to several times their rated capacity. The handle serves as a "safety valve" in that it will bend under maximum overload conditions, thus giving the operator warning to prevent breakage and dropping the load. *Coffing Hoist Co., 800 Walter St., Danville, Ill.*

Specimen spinner

A new cylindrical specimen, which is used in place of the standard specimen holder of the Norelco wide-range goniometer for special X-ray analysis, has recently been announced.

The new unit is designed to facilitate the handling of specimens of limited size and quantity where the problem involves individual analysis of small fibers or filaments, the use of sealed capillary tubes, or the coated fiber method.

The specimen holder is rotated at approximately 130 rpm by means of a precision gear assembly driven by a synchronous motor that plugs into one of the 120 v, 60 cycle, single phase receptacles provided on the X-ray diffraction unit. *North American Philips Co., Inc., Research & Control Instruments Div., 750 S. Fulton Ave., Mount Vernon, N.Y.*



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Toggle switch

A hermetically sealed precision toggle switch whose performance and operating characteristics are unaffected by environmental conditions has been developed. It will deliver its full electrical rating and operating characteristics without regard to changes in atmospheric pressure or temperature and will not be affected by the presence of corrosive atmosphere, dust, dirt, oil or water, according to company officials. Its vaporproof character prevents condensation on switch contacts.

Mechanical life tests indicate the new switch has a life expectancy far greater than the 25,000 operations normally anticipated for hand-operated switches. The toggle mechanism provides a detent for both on and off position. The basic switch has a single-pole, double-throw contact arrangement. *Micro Div., Minneapolis-Honeywell Regulator Co., Freeport, Ill.*

Roof ventilator

A new heavy-duty, high velocity roof ventilator, Power Line Type RVD and RVB, for industrial construction, has recently been introduced. Inconspicuous and weathertight, it is particularly well adapted to new windowless plant construction. Primarily used as an exhaust fan, it can easily be adapted for fresh air supply.

Housing and hood are made of heavy gauge steel, undercoated with noise deadening material for quiet operation. Automatic built-in louvers act as an effective back draft damper. If desired, louvers may be installed at the base of the unit. The hood can be removed for easy inspection. Fans are available in direct and belt-drive. Motors are ball bearing, totally enclosed or explosion-proof. *Chelsea Fan & Blower Co., Inc., 639 South Ave., Plainfield, N.J.*

Time-temperature program controllers

Electronic Dynamaster recording potentiometers are now available in the form of time-temperature program controllers.

These new program controllers regulate temperature according to a predetermined schedule of changing values. Any desired program, such as a heating, soaking, and cooling cycle, can be accurately maintained. The desired schedule of temperatures is prescribed by the contour of a transparent plastic cam. The same controller can be used to maintain any number of different temperature programs, since cams of different contour are easily cut and interchanged. The instruments employ an electronic control system, with proportional input action optionally available. *Bristol Co., Waterbury 20, Conn.*

Glass paper

Papers made of extremely fine fibers of glass are being used in a variety of industrial specialty applications.

These incombustible, inorganic industrial papers are being used for the filtration of hot and/or corrosive air, gases, and liquids. They are also finding application as base sheets in specialty electrical laminates, as gasket material, and as plate separators in aircraft and other special batteries. *Owens-Corning Fiberglas Corp., Toledo 1, Ohio.*

Dragline conveyor truck

The recently improved dragline conveyor truck, with one-piece, arc-welded steel frame, made without bolts or rivets for permanent stability, is built for hard, uninterrupted service.

The "A" frame design (shown) consisting of two diagonal channels, two "V" type hangers, a tubular housing for the axle and the inside wheel washers, all welded into one piece, is rigid in itself and can take any shock or abuse. The "A" frame design also permits the main wheels to be mounted closer to the sides of the truck, providing better load stability. Caster alignment and hanger mounting of main wheels prevents any weaving of the truck. The push bar extending across the superstructure permits manual handling when the truck is not attached to the conveyor. *Lewis-Shepard, Dept. R-5, Watertown, Mass.*

Hydromatic lift trucks

Built especially for the paper industry and other industries where skid under-clearance varies to a large degree, hydromatic lift trucks are now available in a 6 in. lift for loads up to 3,000 lb. and a 5 in. lift for loads up to 4,000 lb. Machine bolted frame and machined, standardized parts speed and simplify occasional repairs, eliminating costly downtime. *Lift Trucks Inc., Cincinnati 14, Ohio.*

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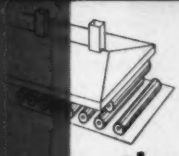

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The Paper Industry New Literature

Books

EUROPEAN TIMBER TRENDS AND PROSPECTS. Prepared jointly by the Secretariats of the Food & Agricultural Organization of the United Nations and the United Nations Economic Commission for Europe. Distributed by International Documents Service, Columbia University Press, 2960 Broadway, New York 27, N.Y. 8½ x 11. 315 pages. Paperbound. $3.50.

This study is presented in four parts: Consumption; Production; Trade; and Summary. Part I, in which the trends of wood consumption are analysed, consists of separate chapters discussing wood consumption in each of its chief end-uses, such as housing, packaging, printing, and textiles, together with a final chapter in which the results are brought together to show consumption trends for the chief wood categories. For each end-use, estimates are made of consumption in 1960.

Part II starts with an historical review of the net annual growth in Europe's forests, of the roundwood cut, and of the domestic supply of industrial wood and fuelwood; and proceeds to an estimate of the supply of industrial wood that, according to present programs, is likely to be forthcoming in 1960. Various measures are then discussed by which this supply could be increased so that it would more nearly meet the estimates of requirements arrived at in Part I.

Part III describes the changing pattern of European trade in wood and its products over the last 40 years and attempts to indicate how trade between Europe and other continents may develop by 1960. The estimates of requirements and supply arrived at in Parts I and II, respectively, are brought together to show the likely pattern of intra-European trade in 1960 on various alternative assumptions.

Part IV summarizes the main findings of Parts I, II and III and tries to bring together the conclusions which have been reached in each part and to relate them to one another. These conclusions, of course, are only tentative.

Numerous tables and diagrams are included.

LANGE'S HANDBOOK OF CHEMISTRY. Eighth Edition. Compiled and edited by Norbert A. Lange. Published by Handbook Publishers, Inc., Sandusky, Ohio. 5⅜ x 7¾. 2014 pages. $7.00.

A thorough revision has been made of all material standing from the preceding seventh edition of this handbook, including hundreds of changes of numerical values throughout the book, as well as the extension and rewriting of 26 tables.

New tables in this edition include: Ionization Potentials of the Elements; Classification of Clay Minerals; Glossary of Inorganic Chemical Nomenclature; Titrimetric Indicators: (a) mixed, (b) oxidation-reduction, (c) fluorescent; Molar Equivalent of a Liter of Gas at Various Temperatures and Pressures, and Density of Moist Air.

The following tables in the seventh edition have been extended or completely rewritten: Changes in Atomic Weights from 1894 to 1951; Table of Nuclides (Isotopes); Effective Radii of Atoms and Ions; Properties of Minerals; Properties of Hormones; Constants of Fats, Oils and Waxes; Physical and Chemical Properties of Natural Resins; Vitamins; Thermal Conductivities of Heat Insulators; Fixed Points for Thermometer Calibration; Acid-Base Indicators; Laboratory Solutions; Equations and Equivalents for Titrimetric Analysis; Gravimetric Factors and Their Logarithms; Organic Solvents; Density of Aqueous Ferric Chloride Solutions; Composition and Freezing Points of Aqueous Antifreeze Solutions; Liquid Standards for Refractive Index Determinations; Correction of Observed Boiling Point; Heat of Fusion of Inorganic Compounds; Heat and Free Energy of Formation of Compounds; Laboratory Arts and Recipes; Photographic Emulsion Speed Ratings; Probable Values of the Physical Constants; Conversion Factors for Units of Measurement, and International Atomic Weight Table 1952.

The material in this handbook is classified under the following headings: Life and Fire Hazards; Chemical and Physical Properties of Classified Substances (Elements, Minerals, Inorganic Compounds, Organic Compounds, Industrial Materials, and Chemical Analysis); Miscellaneous Tables of Specific Properties; and Conversion Factors and Numerical Tables.

Booklets and Pamphlets

X-RAY CHECKING OF SUBSTITUTE MATERIALS. Published by North American Philips Co., Inc., Research and Control Instruments Div., 750 South Fulton Ave., Mount Vernon, N.Y. 8½ x 11. 2 pages. This is a reprint of a technical article from a national trade publication. Illustrated with drawings and photographs, data is presented which explains the use of x-ray diffraction and x-ray spectrometry in handling difficult laboratory and production line tasks. Information is also presented on the basic principles of operation for the two types of instruments. A diagram clearly shows the arrangement and geometry that underlies the basic design.

CONSULTING SERVICES. 14th Edition. Published by Association of Consulting Chemists & Chemical Engineers, Inc., 50 East 41st St., New York 17, N. Y. 8 x 10¾. 144 pages. This revised, enlarged and streamlined edition contains four sections. The Classifier section, which is immediately preceded by a numerical index for easy reference, contains about 200 items of activity with the members specializing or qualifying in the given field indicated by key numbers, which correspond with the scope pages in Section II, describing each member's qualifications and activities. Section III is a new section which presents information on unusual equipment owned by members. Section IV is the index, arranged alphabetically by members and by geographical location.

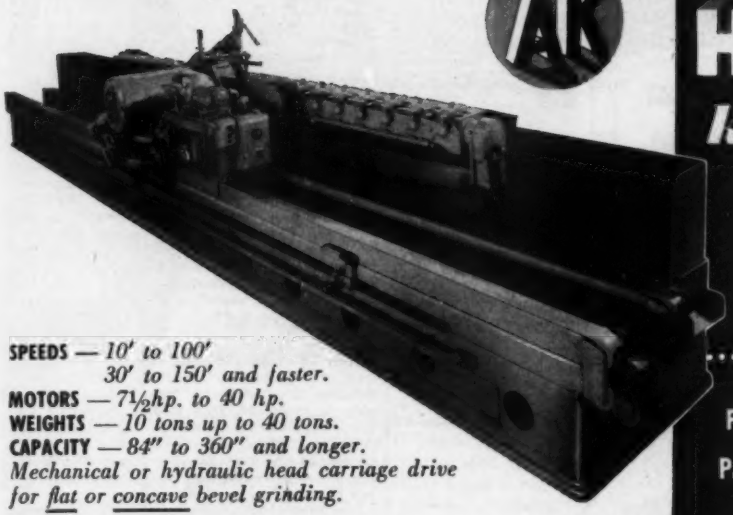
BIBLIOGRAPHY OF FORESTRY AND FOREST PRODUCTS, JANUARY-DECEMBER 1951. Published by Food & Agriculture Organization of the United Nations (Rome, Italy), 1201 Connecticut Ave., N. W., Washington 6, D. C. For convenience of reference, the titles listed in this bibliography are numbered in accordance with the Bibliography of Agriculture published by the United States Department of Agriculture Library. Classified headings are printed in English, French and Spanish.

INDUSTRIAL MAINTENANCE. Published by Wheeler Associates, Inc., 15017 Detroit Ave., Cleveland 7, Ohio. This booklet contains detailed information on such topics as how to keep equipment, methods and facilities in top operating condition, organizing an industrial maintenance program, check list for machinery, plant facilities, and physical environment. Lighting, air conditioning, color painting, noise conditioning, etc., are also covered, in addition to employee operating efficiency, worker health and comfort, and employee morale. A maintenance check list designed to aid in evaluating a company's existing maintenance program is given.

PLANT LAYOUT. Published by Wheeler Associates, Inc., 15017 Detroit Ave., Cleveland 7, Ohio. Designed for administering and operating executives of industry, this booklet covers such topics as the work area, how to develop a better layout, layout planning, work area planning, and basic principles of good layout. Also covered are the following topics: balanced motions, a fixed place, using gravity and drop delivery, using holding devices, pre-positioning of tools and materials, making parts in multiples, and using ejectors and clamps. An improvement check sheet, with more than two dozen questions, is designed to aid in evaluating a company's existing layout.

WHAT PACKAGING REALLY MEANS. By Dr. Ernest Dichter. Published by Paraffined Carton Research Council, 111 West Washington St., Chicago 2, Ill. 5½ x 8½. 14

MODEL AK



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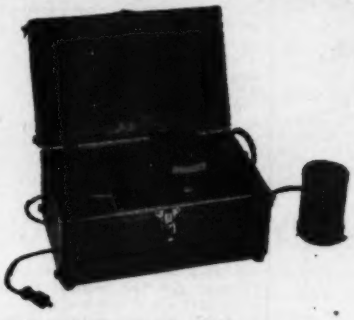

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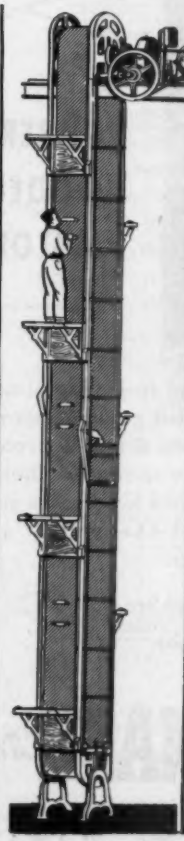

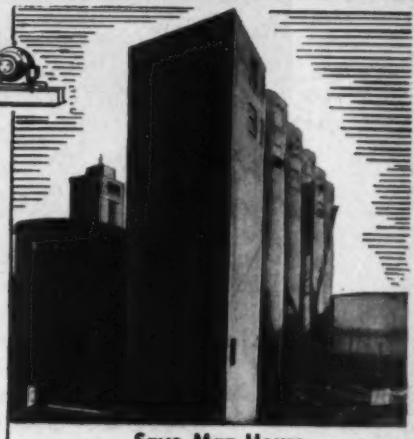

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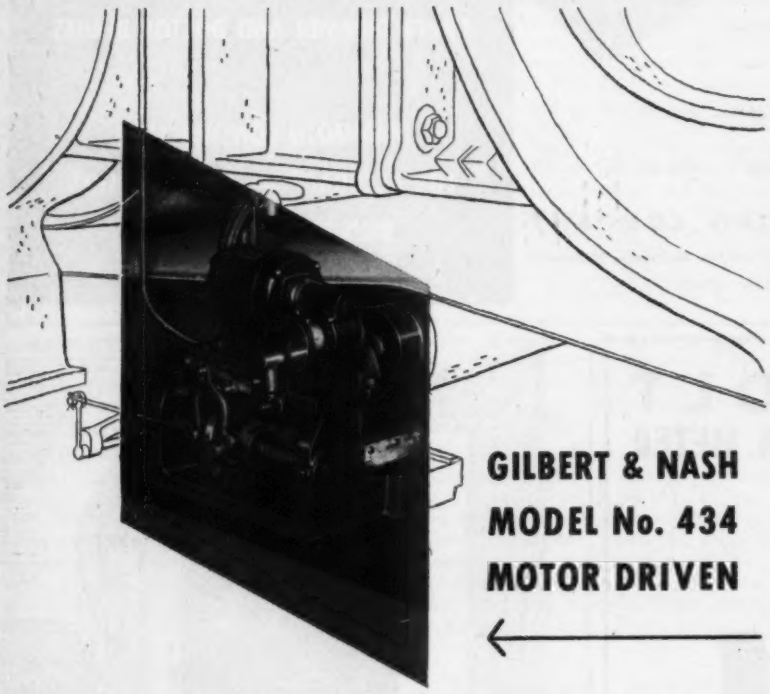
pages. Basic psychology on consumers' attitudes and preferences towards packaging is contained in this booklet by one of the nation's foremost psychological research consultants. Special emphasis is placed on some of the hidden influences of packages, as well as many obvious ones.

DYEING PAPER WHITE (Calco Technical Bulletin No. 830). By M. C. Hutchins, E. I. Stearns, and F. O. Sundstrom. Published by American Cyanamid Co., Calco Chemical Div., Bound Brook, N. J. 8½ x 11. 12 pages. Reprinted from the August, 1952 issue of *Tappi*, this article is divided into two parts: General Principles and The Application of Calcofluor Whites. Topics covered are: chemical bleaching, addition of white pigments, addition of blue dye, addition of fluorescent whitening agents, comparison of different methods of producing white, the evaluation of brightness, evaluation of whiteness with the Hunter reflectometer, evaluation of whiteness from spectrophotometric data, laboratory method to stimulate beater dyeing, variations in dyeing, coating, variations in coating, surface sizing, variations in surface sizing, calender staining, fastness of Calcofluor Whites, and evaluation of paper treated with Calcofluor White.

THE INCENTIVE STORY. Published by Cappel, MacDonald & Co., Dayton 1, Ohio. This new booklet reveals plans used by top companies to get people to do better work. It illustrates all phases of "incentive" planning, from conception to results; unveils a display of "prize-campaign themes" used by 44 leading companies; discloses secrets of actual prize-winning employees, and divulges case records of campaigns used by leading companies selling many different types of products.



GILBERT & NASH
MODEL No. 434
MOTOR DRIVEN

Illustration shows special application of G & N dryer felt guide on short felt in high-grade Bond Wisconsin mill. Where hard-to-control short felts and/or limited head space are problems, Model 434 is the *engineered answer.*

All G & N guides are *designed for the job.*

GILBERT and NASH company

APPLETON, WISCONSIN

Manufacturers' Publications

Through the co-operation of manufacturers and suppliers, THE PAPER INDUSTRY *lists the following catalogues, bulletins and booklets. They may be obtained without cost or obligation, unless otherwise specified, by writing direct to the manufacturers. Please address requests on your company letterhead.*

Shovel-Cranes. Link-Belt Speeder Corp., Cedar Rapids, Iowa—A new 16-page booklet (No. 2418) on pulpwood handling with shovel-cranes is edited for executives and others concerned with pulpwood handling at mill yards and in woodlands in all geographical areas. Titled "How to Cut Costs—Speed Pulpwood Handling at the Mill—In Woodlands," this illustrated brochure points out various phases of handling processes where significant reductions can be made with shovel-cranes. One section explains power hydraulic Speed-o-Matic controls and other features of the company's many models of shovel-cranes.

Lubricant. Fiske Bros. Refining Co., Lubriplate Div. 129 Lockwood St., Newark, N. J.—A new 56-page data book contains a description of "Lubriplate" lubricant and includes detailed product data. The Lubriplate tag plan is explained. One section describes the proper application of this lubricant. Lubriplate recommendations are listed for many types of machinery and industries, including heating and ventilation equipment, chemical process industries, electrical equipment, pulp and paper machinery, water and sewage disposal plants, etc. Lubriplate H.D.S. motor oil is described. Distributors of Lubriplate are listed according to the state in which they are located.

Resin. Hercules Powder Co., Wilmington, Del.—A new technical booklet, containing 12 pages, gives up-to-date information about the use of Vinsol, a low-cost dark-colored resin, in a variety of applications, which include its use in adhesives and paper. Information about the forms in which Vinsol is available and properties of the resins is included in the booklet.

Phase Contrast Microscopy. Bausch & Lomb Optical Co., Rochester 2, N. Y.—This 16-page brochure describes the theory, practical applications, and equipment used in phase contrast microscopy, a technique employed in papermaking, chemistry, and other fields. It is illustrated with a number of diagrams and photographs, including 20 photomicrographs made under magnifications ranging from 210X to 900X. Four of these show graphically the results obtained with phase contrast microscopy as compared with conventional microscopy. Also included is a bibliography on phase contrast microscopy and related subjects.

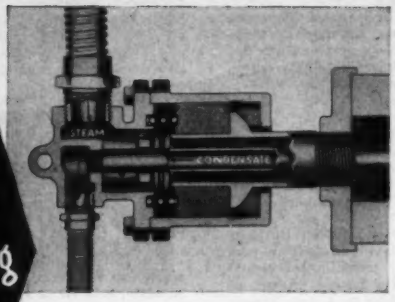
Corrosion-Proof Linings. Nukem Products Corp., Buffalo 20, N. Y.—This 8-page bulletin (A.I.A. File No. 35i-231) describes corrosion-proof linings—Koroseal, rubber, Nuran rubber, neoprene—and acid brick sheathings. A large chart shows the resistivity of these membranes to 84 different solutions. Many photographs are included.

Non-Metallic Disc Valves. Lunkenheimer Co., Box 360-U, Cincinnati 14, Ohio—4-page Circular No. 558, describing the dimensions and functions of non-metallic disc valves, lists in detail the non-metallic disc valves which can easily be renewed or converted to handle another type of service, simply by the insertion of a specifically-designed composition disc.

Control Relay. Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.—Application and design information about the recently introduced Type N control relay is available in Booklet B-5817. An exploded view of the relay shows its construction features, as well as how easily it is disassembled. Also, pictorial instructions show how to obtain the various combinations of normally open-normally closed contacts. A dimensional drawing of the relay and associated wiring circuits is provided.

Temperature Controller. Wheelco Instruments Div., Barber-Colman Co., Rockford, Ill.—A new 4-page bulletin, F-5783, describes the complete line of Model 200 Series Capacitrols, direct reading temperature controllers. Of spe-

New Johnson Self-Supporting Joint



The new Series 2000 Type S Johnson Joint . . . shifts as the roll shifts . . . ends threat of misalignment.

Better than ever because it weighs less, takes less room, costs less. Better because it has longer life, with newly designed carbon-graphite seal rings which give an average of 25% greater wear. Combines all the basic advantages that makes a Johnson Joint the best, most economical way to get steam in, condensate out of rotating rolls and drums: packless, self-lubricating and self-adjusting to varying pressures. Its simple design makes it easy to service or repair right in the field. The perfect answer for many jobs.

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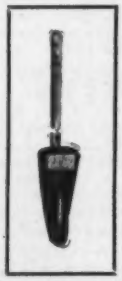
845 Wood St., Three Rivers, Mich.

CAMBRIDGE SURFACE PYROMETER

Enables the paper maker to maintain the desired progressive temperature change in the drying roll train. Thus production may be speeded up to maximum. Eliminates the common cause of spots, cockle, curl and blisters. Available in hand model and with extension attachment. ***Send for bulletin 194S.***



CAMBRIDGE PAPER HYGROSCOPE

(Lithographic Technical Foundation Model) **For printers and lithographers. Indicates the difference in terms of relative humidity between the pressroom air and paper stock. Tells when paper is ready to run. Accurate, rugged, simple to use. Enables better reproduction.** ***Send for bulletin M 353.***

CAMBRIDGE INSTRUMENT CO., INC.

3701 Grand Central Terminal, New York 17, N. Y.

PIONEER MANUFACTURERS OF PRECISION INSTRUMENTS

HERE'S SOMETHING NEW!

Now, you can get high-brightness Dicalite paper-aids packed in high-brightness sulphite!
That's right- throw bag and all in the beater!

Dicalite BP-3 and BP-5 are now available packed in bleached white sulphite bags, made with no string sewing, no colored stock of any kind. Even the small amount of labeling is printed in water-soluble ink.

Paper makers tell us this new packing saves time and trouble. Just slit the bag a couple of times and drop the whole thing in — you get high-brightness paper-aid and high-brightness pulp both at the same time. There is a small extra charge for which you receive good white sulphite waste from the bags, plus easier and cleaner handling.

Dicalite is available in prompt and ample supply. It is a very efficient agent for pitch control. In the sheet it improves formation, speeds drainage and drying and permits higher machine speeds. It is highly effective in liners and fillers of boards; increases liner coverage, extends pulp and titanium at low cost, and increases production.

SEND FOR BULLETIN F-52: Gives data on Dicalite and describes use in paper and paper products

Dependable GREAT LAKES **Dicalite®** DIATOMACEOUS MATERIALS

DICALITE DIVISION • GREAT LAKES CARBON CORPORATION

NEW YORK 17 • CHICAGO 1 • LOS ANGELES 17

cial interest is the new Model 221C, which has the added Capaciline for "straight line" temperature control. A complete description of the anticipating control action of the Capaciline has been made a part of this new bulletin. Additional descriptive information is also included concerning other Model 200 Series Capacitrols that are used for on-off and proportioning control in the solution of industrial heat control problems.

Fire Extinguishers. General Detroit Corp., General Pacific Corp., 1501 E. Washington Blvd., Los Angeles 21, Calif.—"Quick-Aid" fire guards are described in this 6-page bulletin. Some of the equipment described are dry chemical extinguishers, carbon dioxide extinguishers, soda-acid extinguishers, foam-type extinguishers, pump tanks, "Forestry" knapsack fire tank, "Mobile" fire extinguisher cart, pressurized water type fire extinguisher, fire hose, cabinets, racks, etc.

Lacquer Emulsions. Hercules Powder Co., Wilmington 99, Del.—New developments in emulsifying agents and in emulsifying and formulating techniques, which have led to increased uses for lacquer emulsions, are described in the revised editon of Hercules Powder's 8-page "Lacquer Emulsions" technical booklet. The two main sections are devoted to discussions of emulsion composition, which includes material on film-formers, resins and plasticizers, solvents and diluents, emulsifiers, coloration, emulsifying equipment, emulsifying technique, and emulsion stability; and emulsion preparation, which includes material on the preparation of lacquer emulsions based on nitrocellulose, ethyl cellulose, and Parlon (chlorinated rubber).

Floor Patching Material. Master Builders Co., 7016 Euclid Ave., Cleveland 3, Ohio—An iron-asphalt material for patching or resurfacing of worn concrete floors, known as "Masterquick," is described in a new 6-page bulletin. A comparison of this material with stone-asphalt patching materials is made. Complete instructions for patching and resurfacing are listed, with accompanying illustrations. Advantages of this iron-asphalt are also listed.

Production Control. Remington Rand, 315 Fourth Ave., New York 10, N. Y.—Remington Rand synchronized material and production control is the subject of a new 6-page bulletin (No. kd 259). How punched card procedures and Kardex visible systems can be integrated as a complete system is explained.

Sheet Units. Maxson Automatic Machinery Co., 98 Granite St., Westerly, R. I.—High speed sheet units for pulp, paper and board mills and printers and converters are described in a new 10-page bulletin. Such equipment as rollstands, continuous-running pilers, lay-boys, static eliminators, overlapping deliveries, etc., are shown in operation in various plants.

Protective Devices. Multi-Amp Corp., Harrison, N. J.—This 12-page booklet describes in detail how to be sure your current actuated protective devices are really protecting. It explains the importance of current actuated protective devices, such as overload relays, circuit breakers, etc., and gives step-by-step instructions for testing and calibrating them in the field. A complete description of the Model 1010 "Industrial" Multi-Amp, a new portable high current test unit used to test and calibrate protective devices before they are installed, is included, along with specific quotes from users who tell how the Multi-Amp has been integrated with their maintenance programs.

Rubber Linings. Metalweld, Inc., Protective Coatings Div., Scotts Lane & Abbotsford Ave., Philadelphia 29, Pa.—An illustrated 8-page bulletin describing the advantages and application of rubber lining to steel tanks, drums, pipes, valves, fittings and pumps, has recently been published. Included are tables giving the resistance characteristics of rubber lining to inorganic acids, salts and alkalies, organic materials and a wide group of miscellaneous materials. Details on the chemical, abrasive and temperature resistant qualities of rubber linings and the different types of linings available are also given. Metalweld's plant facilities are illustrated.

Zeolite Water Softening. Graver Water Conditioning Co., Dept. 146-S, 216 West 14th St., New York 11, N. Y.—This new 10-page bulletin (WC-108) explains the distinction between the sodium cycle and the hydrogen cycle of zeolite softening and graphically shows the differences in results obtained by the two processes. A description of the design and operation of equipment used in zeolite water softening and the available methods for controlling the various operations in the softening and regenerating processes is given. The various types of the most modern zeolite and ion exchange materials are described and illustrated with photographs of actual size and photomicrographs of typical exchangers, plus a table of the characteristics of the modern action exchangers most commonly used in Graver zeolite softeners. An outline of a simple method of sizing zeolite softeners, with a table of recommended flow rates and an example showing how the size of a softener would be determined to meet specific requirements is included.

Air-Operated Controllers. Bristol Co., Waterbury 20, Conn.—Free-vane, air-operated controllers are described in a new 32-page bulletin, No. A120. Instruments for automatic control of pressure, temperature, liquid level, flow, humidity, pH, and electrical variables are described. Among the new products described are time-program controllers and electronic Dynamaster potentiometers and bridge instruments in air-operated control models. The fully-illustrated bulletin gives complete data on on-off, proportional, reset, derivative, reset plus derivative, and autoset types of controllers.

Dehydrator & Filter. Hankison Corp., 249 Biltmore Bldg., 951 Banksville Rd., Pittsburgh 16, Pa.—The Model B-30-D Condensifilter, a dehydrator, mechanical filter, and automatic trap combined in a single unit, is described in a new 2-page bulletin, which covers construction features, technical data and dimensions. Also included are applications and recommended usage.

Ultraviolet & Visible Spectrophotometers. Beckman Instruments, Inc., South Pasadena 1, Calif.—An inclusive 28-page catalogue of ultraviolet and visible spectrophotometers is designated as Bulletin 303-73. It contains detailed descriptions and illustrations of the

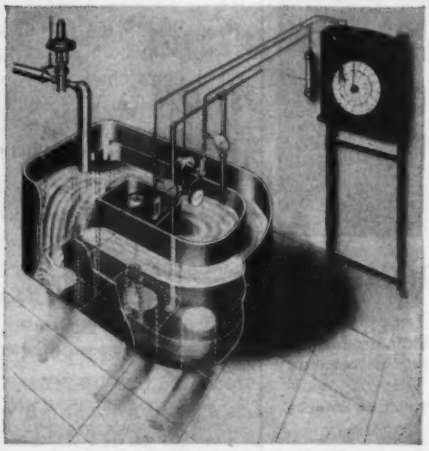
you're not depending on fate

when you use a BRAMMER recording consistency control

Of course, no mill operator consciously leaves his plant operation to Fate. But Fate is tempted where the element of chance in pulp and paper processing is not being constantly minimized.

The ever-rising market standards for quality products at competitive prices demand accurate control of stock consistency in the mill process.

For this reason more and more mills throughout the world are depending on the BRAMMER for proper regulation of pulp stock in varied applications.



The BRAMMER is guaranteed to regulate consistency to ±1/10th of 1 percent. It also controls stock automatically over a wide consistency range and maintains an accurate, daily 24-hour chart on stock consistencies.

Numerous other advantages are described in Bulletin B2 which we will be glad to supply on request.

Manufactured and Sold in Canada by THE ALEXANDER FLECK LIMITED, OTTAWA, CANADA.

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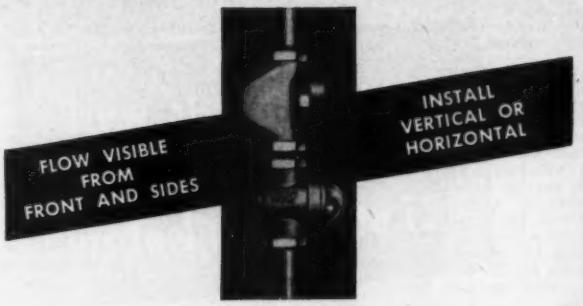

A SIGHT-FLOW INDICATOR THAT NEVER CLOUDS OVER

The Midwest Ball Sight-Flow is the one and only dryer condensate indicator with a "Window" that really stays clear—is constantly being scoured and kept clean by the violence of the liquid as it passes. The thousands already in use on both wet and dry end dryers prove that statement.

Equip your dryers, particularly the wet end section, and keep tab on condensate flow. Add Midwest non-corrosive temperature indicator to spot subnormal temperatures.

Sight-Flow fitting all bronze and non-corroding. Glass ball of heavy Pyrex glass and replaceable. Assembly effective for steam pressures up to 75#. Standard pipe sizes ½", ¾", 1", 1½". Temperature indicator also non-corroding.

Order several now and you'll order more later.

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Sulphur Burning Plants • Jenssen Two Tower Acid Systems • Gas Coolers—Surface and Spray Type • Jenssen Pressure Acid Systems • Jenssen Auxiliary Process Towers • Recovery Plants—Cooking Acid

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FOR BLEACH PLANT APPLICATION
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BE WIS-WISE *use*

PERFECT SURFACE WIRES FOR PERFECT PERFORMANCE

Expertly made with finest precision equipment from extra select wire. Backed by years and years of experience is your assurance of the very best.

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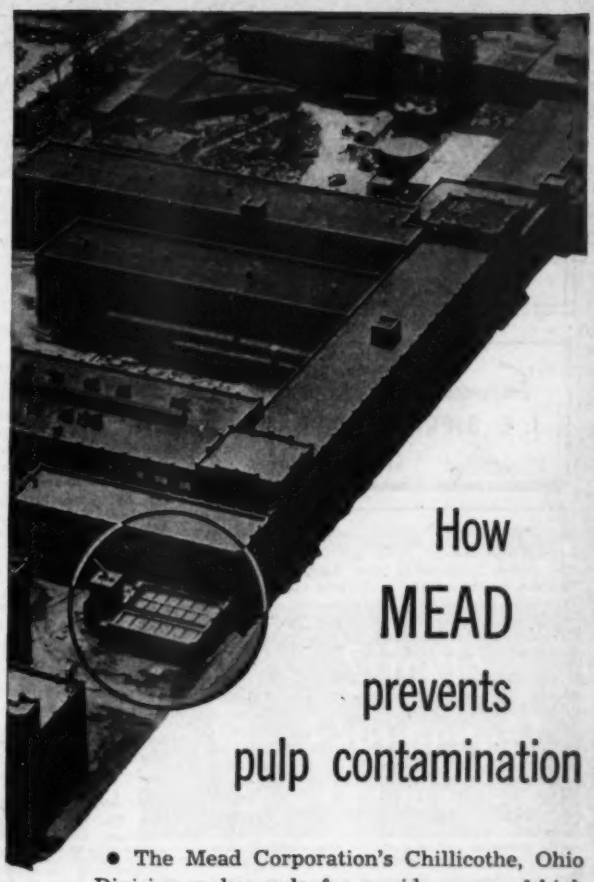

How MEAD prevents pulp contamination

• The Mead Corporation's Chillicothe, Ohio Division makes pulp for a wide range of high quality papers.

In proposed three-stage chlorine, caustic, and hypochlorite bleaching, untreated well water would have caused trouble. When its 266 ppm of calcium hardness came in contact with caustic soda, heavy scale would form on bleach tanks. Such scale breaks loose in discolored chunks, plugging washer wires, contaminating pulp.

Two Permutit Precipitators installed in 1947 prevented these problems . . . remove hardness. They also eliminate the waste of weekly descaling of turbine condensers. Efficient Precipitator reaction reduces iron—prevents spotting of pulps and papers—without the need of filters!

Permutit know-how and equipment can help you to produce finer pulps and papers at lower costs—regardless of raw water conditions. For details, please write to THE PERMUTIT COMPANY, Dept. PI-9, 330 West 42nd Street, New York 36, N. Y., or Permutit Company of Canada, Ltd., 6975 Jeanne Mance St., Montreal.

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WATER CONDITIONING HEADQUARTERS FOR OVER 40 YEARS

The Paper Industry
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Industrial Plants • Textile & Paper Mills • Location Studies • Appraisals • Reports • Surveys
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GREENVILLE
SOUTH CAROLINA

Model B and DU spectrophotometers, as well as descriptions of such auxiliary units as the flame, reflectance and fluorescence attachments. An extensive section treating the complete line of spectrophotometer cells, interchangeable sample compartments, and cell adapters is featured. A composite price list-index is also furnished.

Choker Sling Fitting. Electroline Co., 4121 South LaSalle St., Chicago 9, Ill.—This 4-page brochure describes a new wire rope choker sling fitting. It shows typical applications for which the new fitting is suitable. There are close-up views of the optional locking shoe device, which keeps non-rigid loads tightly bound. "How to use it" drawings explain how the fitting works, and a cutaway section shows the simple socket arrangement, which permits easy installation of the fitting and enables it to be re-used after the wire rope has worn out.

Roller Chains & Sprockets. Chain Belt Co., Baldwin-Duckworth Div., Dept. P.R., Springfield 2, Mass.—54-page Bulletin No. 52-1 describes Baldwin-Rex roller chains and sprockets. The inherent advantages of roller chain are described, and all the popular sizes of roller chains are illustrated. A section of the bulletin is a treatise on "how to select standard roller chain drives," with formulas, tables and examples illustrating this procedure. Roller chain dimensions, strengths, weights, and prices are included. One section deals with stock sprockets, their characteristics and prices. Bore, keyway and setscrew information is presented. Proper maintenance of chain drives is reviewed, and information on chain vises, flexible couplings and coupling covers is provided.

Lubrication. Pure Oil Co., Advertising Dept., 35 E. Wacker Drive, Chicago 1, Ill.—For the harried plant maintenance superintendent or lubrication engineer who finds himself with too few oilers and too many lubricants, a new booklet entitled "How to Simplify and Save Pure Industrial Lubricants" has been announced. This booklet sets up six simple steps to streamline your lubrication program and goes on to point out that for the average plant a maximum of six lubricants will do a satisfactory job.

Wire Screen & Filter Cloth. Multi-Metal Wire Cloth Co., Inc., 1350 Garrison Ave. at Whittier St., New York 59, N.Y.—This 6-page bulletin, No. 531, presents five case histories showing the varied uses of Multi-Metal wire cloth and filter cloth in different industries. Many photographs and drawings are included.

Photoelectric Recorder Applications. General Electric Co., Schenectady 5, N.Y.—12-page Bulletin GEA-5536 describes applications of the photoelectric recorder with seismology, psychology, textile, metals, fatigue and research testing equipment, as an aid in the quick detection of pipeline corrosion, and in development and machinability testing, medical research, light-intensity study, and paper-machine-speed measuring. A listing of the recorder's typical rating is included.

Testers. W. C. Dillon & Co., Inc., P.O. Box 3008, 14620 Keswick St., Van Nuys, Los Angeles, Calif.—Revised bulletins on the Dillon testers are now available. 4-page Bulletin No. 2 describes the Model "L" universal tester which will test materials with a tensile strength varying from only a few pounds up to 160,000 psi. 4-page Bulletin No. LR2 describes the multi-low-range universal tester with a working range of 0-100 lb. Complete technical data is presented. Many photographs are included. A price list and list of typical users is included with each bulletin.

Plasticized Synthetic Resin Adhesives. Monsanto Chemical Co., Organic Chemicals Div., St. Louis, Mo. — 8-page Technical Bulletin No. 0-99 presents typical formulations of the major synthetic resin adhesives: emulsion, hot-melt, delayed-tack, solvent, pressure sensitive and adhesive primers or coatings. The bulletin discusses the properties and uses of the various types and includes a table evaluating Monsanto plasticizers in polyvinyl acetate adhesive formulations for compatibility, volatility, low temperature flexibility and grease resistance.

Flow Meters. Minneapolis-Honeywell Regulator Co., Industrial Div., Station 64, Wayne & Windrim Aves., Philadelphia 44, Pa.—A set of seven new specification sheets in consolidated style covers Honeywell's flow meter line. Specification sheets 241 and 242 cover electric evenly graduated flow meter bodies and mechanical evenly graduated flow meters, respectively. Specification Sheets 243 through 247 cover square root flow meters and liquid level meters. Specification Sheet 244 also includes evenly graduated electric flow meters (inductance bridge receivers). Construction and engineering details are included.

Mechanical Pressure Gauge. W. C. Dillon & Co., Inc., 14620 Keswick St., Van Nuys, Los Angeles, Calif.—4-page Bulletin PG-2 describes the mechanical pressure gauge, including pertinent dimensions, and contains a number of new "use" illustrations. Also included with this bulletin is a price list and typical user list.

Truck Crane. Schield Bantam Co., Waverly, Iowa—The 6-ton, ¾-yd. Model T-35 truck crane is described in a new 6-page bulletin, TCR-201, which contains detailed mechanical specifications, together with complete dimensions and operating data, including information on various truck mountings and typical interchangeable attachments used with the Bantam crane boom. Charts show Bantam lifting capacities at various radii for both 2½ and 4-ton truck-mountings, using 25 ft. to 45 ft. booms. Over-end and over-side ratings, with and without outriggers, are included. Improved engineering features of this truck crane are pictured and described.

Masonry Waterproofing. L. Sonneborn Sons, Inc., Dept. P-6, Building Products Div., 404 Fourth Ave., New York 16, N. Y.—This new 6-page literature compares results given after testing various silicone water repellents. These tests, performed by York Laboratories of Stamford, Conn., describe in detail their rigorous test procedures and impartial conclusions. The tests concisely point out the important differences between one silicone to another.

Stuff Gate Positioning System. Foxboro Co., Foxboro, Mass.—A new system of stuff gate positioning which gives the paper machine crew closer control of basis weight is described in a new engineering data sheet (AED 260-17). The illustrated data sheet lists instrument specifications, compares new and old techniques in stuff gate positioning, and emphasizes the advantages of the new system in specialty machine applications, where frequent changes in grades and weights are easily made from the remote stations.

Driver Safety-Training (Film). Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich.—A new 30-minute sound, training and safety film for industrial truck operators is titled "Safety Saves." It was filmed at on-the-job factory and warehouse locations. The film dramatically illustrates the "do's and don'ts" of safe driving and shows the cause of most truck accidents and how to avoid them.

Plastic Rubber. Magic Chemical Co., Dept. 142, 121 Crescent St., Brockton 2, Mass.—Complete information about how to use "Magic-Vulc" plastic rubber for repairing conveyor belts is contained in a new folder now being distributed. Names of industrial users and actual case history reports are included.

Power From Wood Waste. Fairfield Engineering Co., Contract Div., Marion, Ohio—This 4-page bulletin, No. 652, describes the latest type of equipment used by industries in recovering power from their wood waste material. Featuring a step-by-step story on the Fairfield handling system employed by a large paper and pulp mill for power recovery from bark, the bulletin also describes an installation at a southern furniture plant where power is economically recovered from kiln dried shavings and sawdust.

Wall Washing Machine. Ross & Story Products Corp., 705-707 Dewitt St., Syracuse 1, N. Y.—This 4-page illustrated folder presents advantages of cleaning walls and ceilings with a non-electric, portable chemical wall washing machine.

Flow Control Valve. Airmatic Valve, Inc., 7317 Associate Ave., Cleveland 9, Ohio—2-page Bulletin No. 4810 describes a flow control valve designed to control the speed of the piston stroke in a cylinder. Features, dimensions and specifications are included.

Stainless Steel Tanks. Rodney Hunt Machine Co., 53 Mill St., Orange, Mass.—A new 4-page bulletin, No. 158, shows the range of Rodney Hunt engineered stainless steel fabrications. Particular attention is given to stainless steel tanks of standard and special construction in a wide range of sizes. A simplified quotation request sheet with detailed standard specifications is included.

Solenoid Valves. Atkomatic Valve Co., 545 W. Abbott St., Indianapolis, Ind.—Information on industrial applications of Atkomatic solenoid valves is now available in the form of bulletins. Bulletins deal with individual applications, such as hydraulic operations, steam, air, and gas and show typical operating diagrams.

Lubricators. Hills-McCanna Co., 3025 N. Western Ave., Chicago 18, Ill.—Catalogue L-52, containing 16 pages, describes Hills-McCanna force feed lubricators for all types of machinery. Design, construction, types, sizes, dimensions, and prices of the open and enclosed type lubricators are given. Photographs and a brief description of lubricator accessories and other products of Hills-McCanna are included.

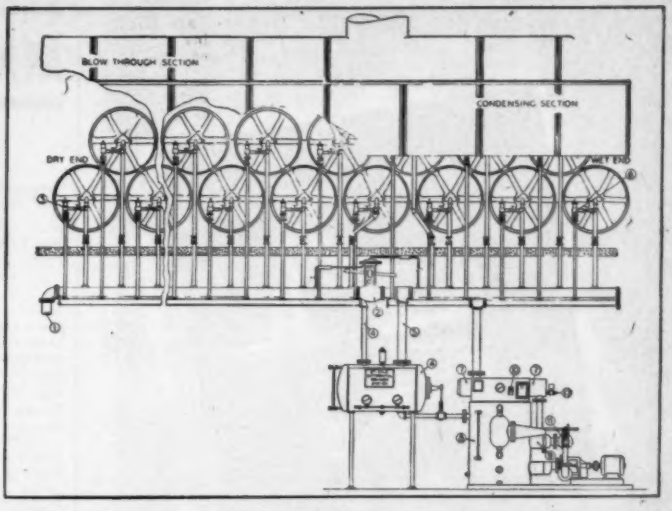
Compressor. Roots-Connersville Blower, Connersville, Ind.—4-page Bulletin SC-152 illustrates the construction of the Spiraxial compressor.

Shower Pipes. Sandusky Foundry & Machine Co., Sandusky, Ohio—Bulletin 137, containing 4 pages, describes the features and applications of the Chief Sandusky shower pipe and outlines its development and acceptance.

Process Control Instruments. Fischer & Porter Co., 7240 County Line Road, Hatboro, Pa.—A new 24-page bulletin, A-130-1, entitled "Measurement and Control Instruments for the Pulp and Paper Industry," describes the principal features and many applications in pulp and paper mills of process control instruments. Included in the bulletin are descriptions of the new Resotronic continuous quantitative analyzer for wide-range consistency control, the new P-4 pneumatic controller and two recent additions to Fischer & Porter's line of pneumatic controlled valves. Liberally illustrated with mill installation photographs and flow diagrams, the booklet also presents details of Fischer & Porter's engineering service and associated facilities.

Rubber-Lined Pumps. Warren Steam Pump Co., Inc., Warren, Mass.—4-page Bulletin WQ-212 is devoted to rubber-lined centrifugal chemical and process pumps, designed and built especially for handling hydrochloric and other strong acids and corrosive salts. Included are service characteristics, construction features, advantages, specifications, dimensions, and sectional and external views.

New Stickle Vacuum Differential Drainage Cuts fuel costs 10 to 15%



Installed, as above, the new Stickle Vacuum Differential Drainage employing Improved Stickle Vacuum Pump, boosts production—cuts costs.

Free your dryers of condensate and air—quickly and economically. Install new Stickle Vacuum Differential Drainage — an all-Stickle unit, all-profitable for you!

You are always *sure* of proper drainage, whether your machines operate at above or below atmosphere pressure. You simply reset pump controls to meet whatever pressure changes are required.

New Stickle Pump—designed for Vacuums up to 28"—saves you money many ways. Every vital part is easily accessible, permitting quick, easy inspection and maintenance. Built-in heat exchanger eliminates costly cooling equipment. No close clearances—no "rub" anywhere!

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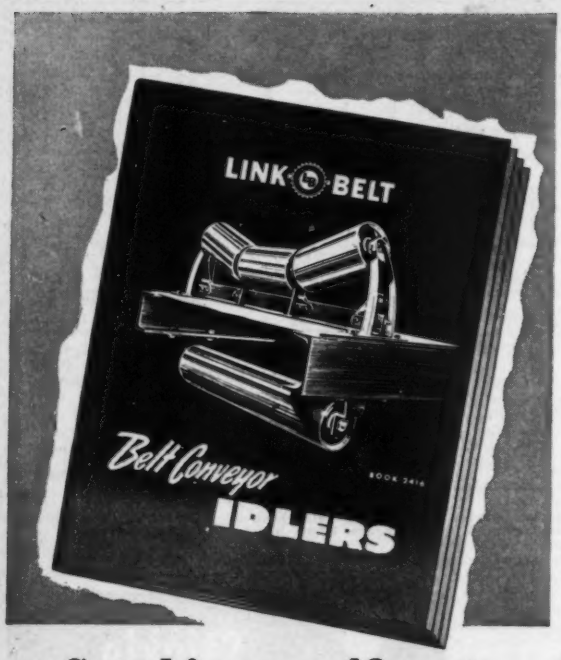

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RAGS (Domestic)

NEW RAGS

The following are quotations to mills, f.o.b. New York:

No. 1 White Shirt Cuttings	12.00 to 13.00
New Unbleached Muslins	14.00 to 15.00
Fancy Shirt Cuttings	6.75 to 7.00
No. 1 Percales	6.75 to 7.00
No. 1 Washables	3.50 to 3.75
No. 1 Light Silesias	8.00 to 8.50
No. 1 Light Prints	6.50 to 6.75
Light Flannelettes	8.00 to 8.50
Cottonades	4.00 to 4.25
Blue Overalls	7.00 to 7.50
Blue Cheviots	7.00 to 7.50
Canton Flannels, Bleached	11.00 to 11.50
Canton Flannels, Unbleached	11.00 to 11.50
Osnaburg Cuttings	8.00 to 8.50
Underwear Cuttings, Bleached	14.50 to 15.50
Underwear Cuttings, Unbleached	14.50 to 15.50
Khaki Cuttings—	
Sun Tan	8.50 to 9.00
Mixed	4.00 to 4.25
Linen Cuttings—	
American	8.00 to 8.50
White	13.00 to 14.00
Grey	13.00 to 14.00

RAGS (Domestic)

OLD RAGS

Quotations to consuming mills, dollars per hundred pounds, f.o.b. New York, follow:

	per cwt.
Roofing—	
No. 1	1.25 to 1.35
No. 2	.95 to 1.05
No. 3 and 4	.80 to .90
Twos and Blues—	
Repacked	2.25 to 2.50
Thirds and Blues—	
Repacked	2.00 to 2.25
Miscellaneous	1.75 to 2.00
Whites, No. 1—	
Repacked	5.50 to 5.75
Miscellaneous	4.75 to 5.00
White, No. 2—	
Repacked	4.50 to 4.75
Miscellaneous	3.75 to 4.00

RAGS (Foreign)

ex dock New York City

NEW RAGS

	per cwt.
New Dark Cuttings New Mixed Cuttings New Light Silesias Light Flannelettes Unbleached Cuttings New White Cuttings New Light Oxfords New Light Prints	Nominal

RAGS (Foreign)

ex dock New York City

OLD RAGS

	per cwt.
No. 1 White Linens No. 2 White Linens No. 3 White Linens No. 4 White Linens No. 1 White Cottons No. 2 White Cottons No. 3 White Cottons No. 4 White Cottons Extra Light Prints Ord. Light Prints Med. Light Prints Dutch Blue Cottons French Blue Cottons French Blue Linens Checks and Blues Linsey Garments Dark Cottons Old Shoppers	Nominal

ROPE and BAGGING

f.o.b. and ex dock New York City

	per cwt.
Gunny No. 1—	
Foreign	4.75 to 5.00
Domestic	4.75 to 5.00
Wool Tares—	
Light	5.50 to 5.75
Heavy	5.75 to 6.00
No. 1 Scrap Bagging	4.00 to 4.25
Manila Rope—	
No. 1 large	7.00 to 7.50
No. 1 small	6.00 to 6.50
Sisal Rope—	
No. 1 large	6.00 to 6.25
No. 1 small	5.50 to 5.75
New Burlap Cuttings	6.50 to 7.00
Jute Threads—	
Foreign (Nom.)	6.75 to 7.25
Domestic	6.75 to 7.25
Strings—	
No. 1 sisal	5.25 to 5.50
No. 2 sisal	4.75 to 5.00
Soft jute	5.25 to 5.50
Mixed	3.00 to 3.25

WASTE PAPER

The following are quotations, dollars per ton, for No. 1 packing f.o.b. New York:

	per ton
Shavings—	
Hard White Env. Cuts	115.00 to 125.00
Hard White No. 1	85.00 to 90.00
Soft White, one-cut	70.00 to 75.00
Soft White, No. 1	55.00 to 60.00
Coated Soft	40.00 to 45.00
Fly Leaf No. 1	25.00 to 30.00
Fly Leaf, Woody No. 1	25.00 to 30.00
No. 2 Mixed Col. Woody	20.00 to 25.00
Flat Stock—	
No. 1 Heavy Books and Magazines, Repacked	20.00 to 22.00
Mixed Books	14.00 to 15.00
Ledger Stock—	
No. 1 White	55.00 to 60.00
No. 1 Mixed (Colored)	35.00 to 40.00
Manilas—	
New Env. Cuttings	65.00 to 70.00
New Env. Cuts, One-Cut	
Extra Manilas	22.50 to 25.00
Manila Tab Cards, Free of Ground Wood	65.00 to 70.00
Colored Tab Cards	45.00 to 50.00
Kraft—	
New Envelope Cuttings	65.00 to 70.00
Tripled Sorted No. 1 100%	37.50 to 42.50
No. 1 Old Assorted	27.50 to 32.50
News—	
White Blank	55.00 to 60.00
Overissue	22.00—
No. 1 Folded	15.00—
Old Corrugated Containers	26.00—
New Jute Corrugated Cuts	28.00—
Mill Wrappers	17.00—
New Board Chips	14.00—
No. 1 Mixed Paper	12.00—

CHEMICALS

f.o.b. shipping point

Alum (Papermakers)—	
Lump, cwt.	4.35—
Ground, cwt.	3.85—
Powdered, cwt.	4.70—
Blanc Fixe—	
Pulp, bulk, ton	100.00—
Dry, barrels	105.00—
Bleaching Powder—	
Drums, cwt.	5.00 to 6.00
Casein (Domestic Standard)	
20-30 mesh (bags), lb.	
80-100 mesh (bags), lb.	23.00—
Argentine, lb.	22.00 to 23.00
China Clay—	
Domestic Filler	
Bulk (mine) ton	10.00 to 15.00
Domestic Coating	
Bulk (mine) ton	17.00 to 25.00
Imported (ship side)	
Bulk (lump) ton	20.00 to 30.00
Chlorine—	
Tank cars (wks) cwt.	2.95—
Gelatine (silicon), lb.	1.25 to 1.35
Glyc. (C.P.) drums, lb.	44.00 to 44.50
Litharge, powd. bbl. lb.	.15½ to .16

MARKET QUOTATIONS

	New York, per 100 lbs.	
Rosin (Gum)—		
E	8.40—	
F	8.40—	
G	8.40—	
WW	8.65—	
Rosin (Wood), carlots, F.O.B. South	6.50—	
Salt Cake—		
Dom. bulk (wks) ton	19.00 to	23.00
Imp. bulks on dock—(Atl. ports) ton (Nom.)	22.00—	
Soda Ash—		
Bulk (works) cwt.	1.45—	
Paper bags, cwt.	1.65—	
Soda (Caustic)—		
Solid drums, cwt.	3.70 to	4.45
Ground and flake, drums, cwt.	4.10 to	4.85
Sodium Silicate—		
60 deg. 55 gal. drums, (works) cwt.	1.60 to	1.70
40 deg. 35 gal. drums, (works), cwt.	1.30 to	1.40
Starch—		
Pearl, 140 lb. bags, cwt.	6.39—	
Pearl, barrels, cwt.	6.39—	
Paper (Sp.) bags, cwt.	6.39—	
Powdered, barrels, cwt.	6.60—	
Sulphur (Crude) (Mine) bulk, long ton	25.50 to	27.50
Talc—		
Dom. 100 lb. bags (mine) ton	25.00 to	35.00
Canadian	35.00 to	45.00
Titanium Dioxide—		
Barium Pig. bbls., lb.	.21 to	.21½
Calcium Pig. bbls., lb.	.21 to	.21½
Zinc Sulphide, bbls., lb.	11.50 to	11.75

WOOD PULP

Quotations on domestic and Canadian wood pulp, dollars per short air dry ton, delivered consuming mills including basic freight allowances, follow:

Bleached Sulphite	140.00—
Bleached Sulphite, Canadian	140.00—
Unbleached Sulphite	120.00—
Unbleached Sulphite, Canadian	130.00—
Bleached Soda	140.00—
Bleached Soda, Canadian	140.00—
Kraft, Bleached	145.00—
Kraft, Bleach., Southern	142.50 to 150.00
Kraft, Bleach., Canadian	145.00 to 150.00
Kraft, Unbleached, Northern	132.50—
Kraft, Unbleached, Southern	100.00—
Kraft, Unbleached, Canadian	100.00 to 125.00
Kraft, Semi-Bleached, Southern	140.00—
Sulphite Screenings	72.50—
Sulphate Screenings	67.50—
Groundwood	82.50 to 87.50

Quotations on imported wood pulp, dollars per short ton, on dock American Atlantic ports with varying freight allowances, follow:

Bleached Sulphite, Swedish	130.00 to 140.00
Bleached Sulphite, Norwegian, freight allowed	140.00—
Bleached Sulphite, Finnish, freight allowed	140.00—
Unbleached Sulphite, Swedish	110.00 to 115.00
Unbleached Sulphite, Finnish, freight allowed	120.00 to 125.00
Kraft, Unbleached, Swedish	100.00 to 105.00
Kraft, Unbleached, Finnish, freight allowed	105.00 to 135.00
Kraft, Bleached, Swedish, on dock	137.50 to 142.50
Kraft, Bleached, Norwegian	

PAPER

Boards—

Prices per ton, delivered, 10 tons or more:

Plain Chip	80.00—
News vat lined chip	92.50—
Filled news	85.00—
Solid news	90.00—
White vat lined chip	125.00—
Chip tube and can stock	100.00—
Single manila lined chip	122.50—
Single jute lined chip	125.00—
White patent coated:	
.020	155.00—
.018	157.50—
.016	160.00—

Book Paper—

Coated two sides

70 lb. No. 2 enamel, 25x38-500, trimmed 4 sides	4 cases $17.25 Carloads $16.30
45 lb. enamel, 25x38-500, trimmed 4 sides	4 cases $13.05 Carloads $12.10

Uncoated

55 lb. No. 2 offset, 25x38-500, trimmed 4 sides	4 cases $14.50 Carloads $13.85
50 lb. A Grade English Finish, 25x38-500, untrimmed	4 cases $14.05 Carloads $13.10
20 lb. envelope, 17x22-500, untrimmed	Carloads $12.40
16 lb. tablet, 17x22-500	Carloads $11.35

Rag Content Bond—

Extra 100% rag	70.45—
100% rag	62.65—
75% rag	48.15—
50% rag	38.90—
25% rag	31.75—

Rag Content Ledger—

Extra 100% rag	72.65—
100% rag	63.90—
85% rag	52.50—
75% rag	49.40—
50% rag	40.20—
25% rag	33.00—

Sulphite Bond—

Air dry bond (Watermarked)	19.00—
No. 1 bond (M.F. watermarked)	15.00—
No. 2 bond (M.F. watermarked)	14.00—
Plain bond (M.F. unwatermarked)	14.00—

Sulphite Ledger—

No. 1, M.F. watermarked	20.50
No. 2, M.F. watermarked	19.50
Plain, M.F. unwatermarked	19.00

News—

	per ton
Rolls, Standard (Contract)	125.00 to 126.00
Rolls (Spot)	(Nominal)
Sheets	128.00—

Tissues (Carlots)—

	per ream
White No. 1	1.75—
White No. 2	1.35—
Bleached Anti-Tarnish	2.20—
Colored	2.00—
Anti-Tarnish Kraft	1.65—
Manila	2.00—
Napkins, semi-crepe (12½ lb. to M shts.) per cs.	.90—
Napkins, full crepe and embossed (12½ lb. to M shts.) per cs.	.90—
Toilet, Bleached (M shts.) per cs.	9.35—
Toilet, Unbleached (M shts.) per cs.	7.90—

Towels

	per case
Bleached	6.80—
Unbleached	5.90—

Wrappings (Kraft)—

	per cwt.
Standard wrapping	7.75—
Butchers, counter rolls	8.25—
Standard bag, mill rolls	7.50—
Shipping sack, mill rolls	7.75—
Gumming, mill rolls	8.00—
Asphalting, mill rolls	7.75—
Envelope, mill rolls	9.25—

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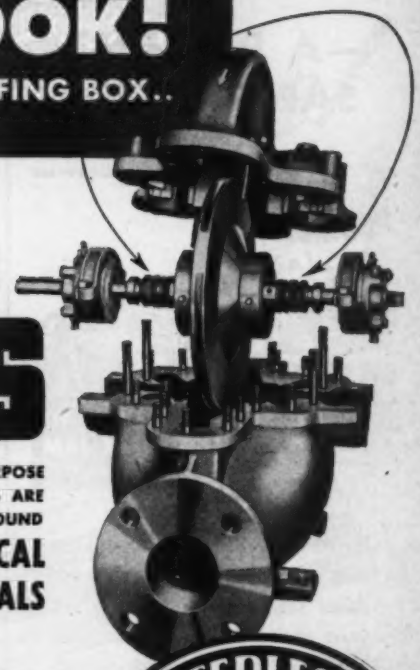

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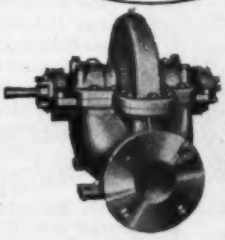

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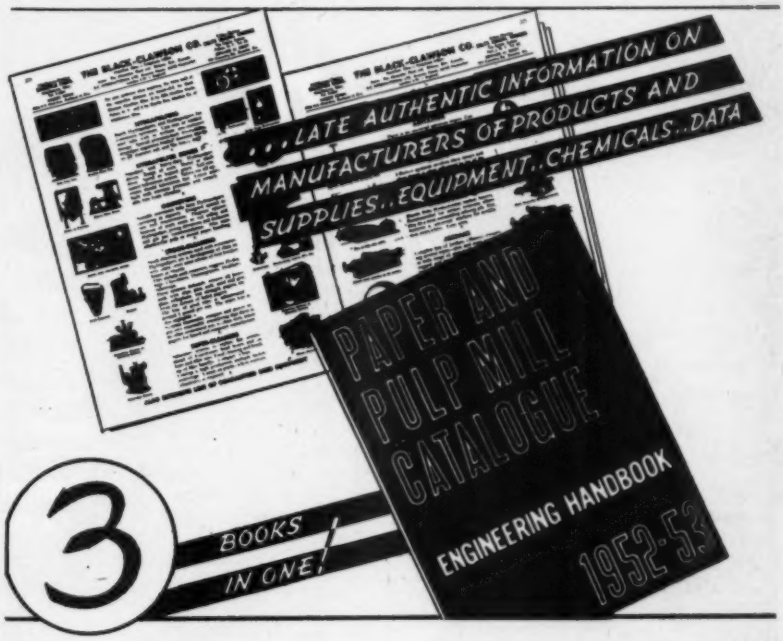

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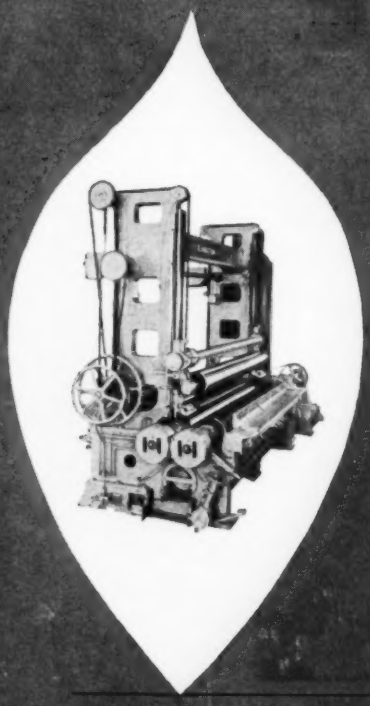

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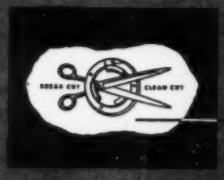
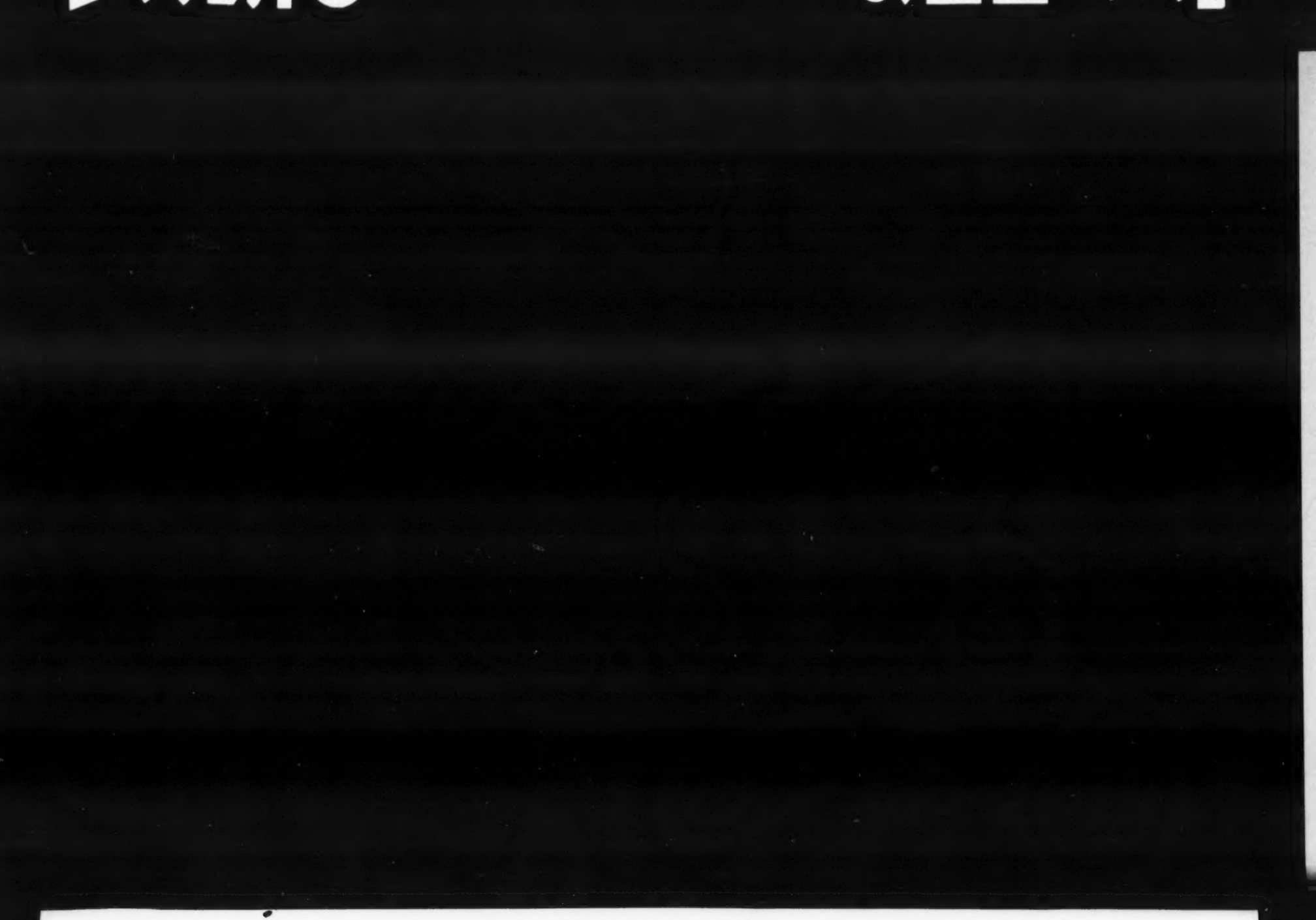
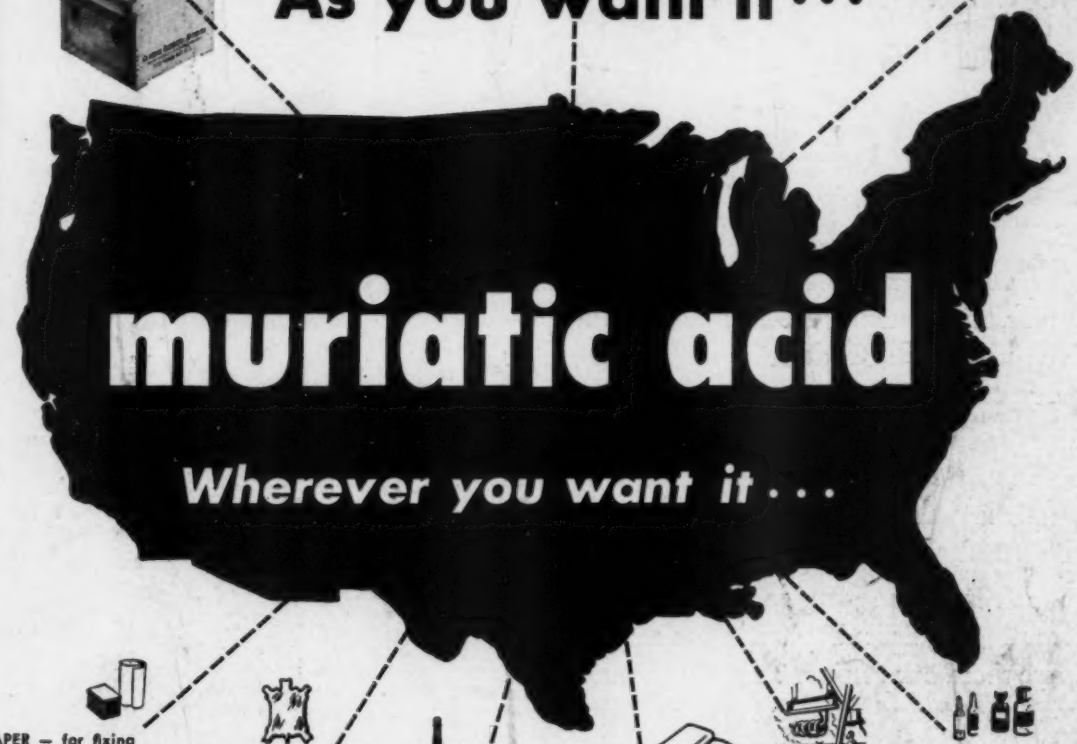




As you want it . . .



muriatic acid

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LEATHER—in chrome tanning

PETROLEUM—for oil well acidizing; treating catalysts

TEXTILES—for souring; removing hypochlorite bleach; dyeing

METALS — for pickling; descaling; plating

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Basic Chemicals for American Industry

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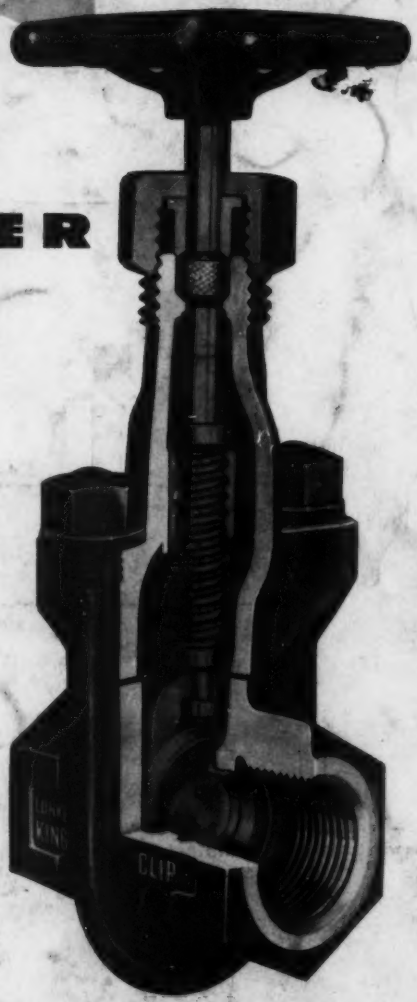
Tightest gate valve . . . . . you ever used!

the original clip valve with the NEW **non-slip®** *handwheel**

King-clip®

by **LUNKENHEIMER**



It closes tight . . . it stays tight . . . and here are four good reasons why:

The new Non-Slip Handwheel provides a firmer, more comfortable grip for closing — even when the operator's hands are wet or greasy.

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Stemalloy* stems, in the Iron Body Bronze Mounted patterns, have amazing resistance to thread wear. Millions are in use, and *not one* has ever been returned due to wear failure.

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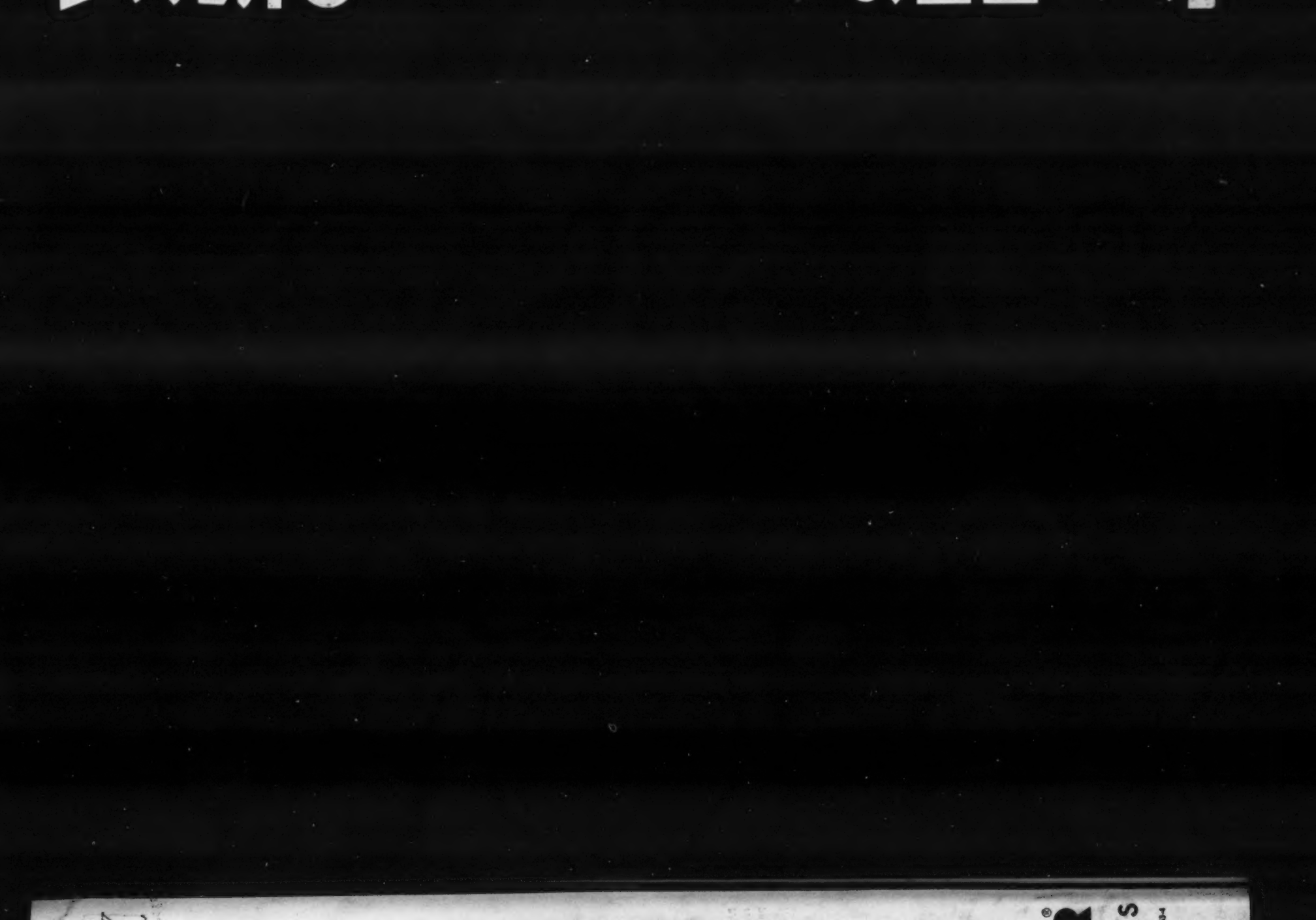
Ask your Lunkenheimer Distributor about "King-clip" — the original Lunkenheimer clip valve with cast-in drain channels and a bonnet-thread bushing for perfect stem alignment. For full details, request Circular 561 from your distributor or The Lunkenheimer Company, Box 360S, Cincinnati 14, Ohio.

*Patented

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

L-753-4



KANSAS

OKLAHOMA

TEXAS

WICHITA

WICHITA FALLS

OKLAHOMA CITY

FORT WORTH

DALLAS

Santa Fe

Frisco

M. K. T.

L. A. & T.

R. I. L.

F. L.

C. B. R.

T. & P.

Arkansas River

Red River

Colorado River

Brazos River

Canadian River

53

M.K.T.
Frisco
M.
K.
T.
Lines
MK.T.
PARSONS
MISSOURI
K. T. Lines
Frisco
M. P.
TULSA
River
F. L.
M. River
Arkansas River
LITTLE ROCK
N. L. R.
TEXARKANA
C. B. R.
CAMDEN
CROSSETT
SPRING HILL
SHREVEPORT
Y. & M. V.
WEST MONROE
HODGE
Sabine River
Red River
Valley
ELIZABETH
ORANGE
Sp. Pac.

ST. LOUIS

K E

O U R I

Lines

Frisco

M. & O.

C. B. & Q. Lines

Ohio River

L. & N.

N. C. & St. L.

Tenn.

M. & O. L.

G. M. & N.

JACKSON

Tennessee River

L. & N.

N. C. & St. L.

MEMPHIS 50

L. & N.

T E N N

S S I P P I

Y. & M. V.

Black River

JACKSON

MERIDIAN

BIRMINGHAM

50

TUSCALOOSA

EASTROP

28

CASEVILLE

MOSS POINT

32

MONTGOM

E N T U C K Y

KINGSPORT

BRISTOL

HARRIMAN

KNOXVILLE

ASHEVILLE

GREENVILLE

ATLANTA

AUGUSTA

MACON

COLUMBUS

VALDOSTA

PISGAH FOREST

S E S E

S O U T H

G E O R G I A

COVINGTON
BUENA
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ROANOKE
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AGUSTA
SAVANNAH
CHARLESTON
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C.R.C.
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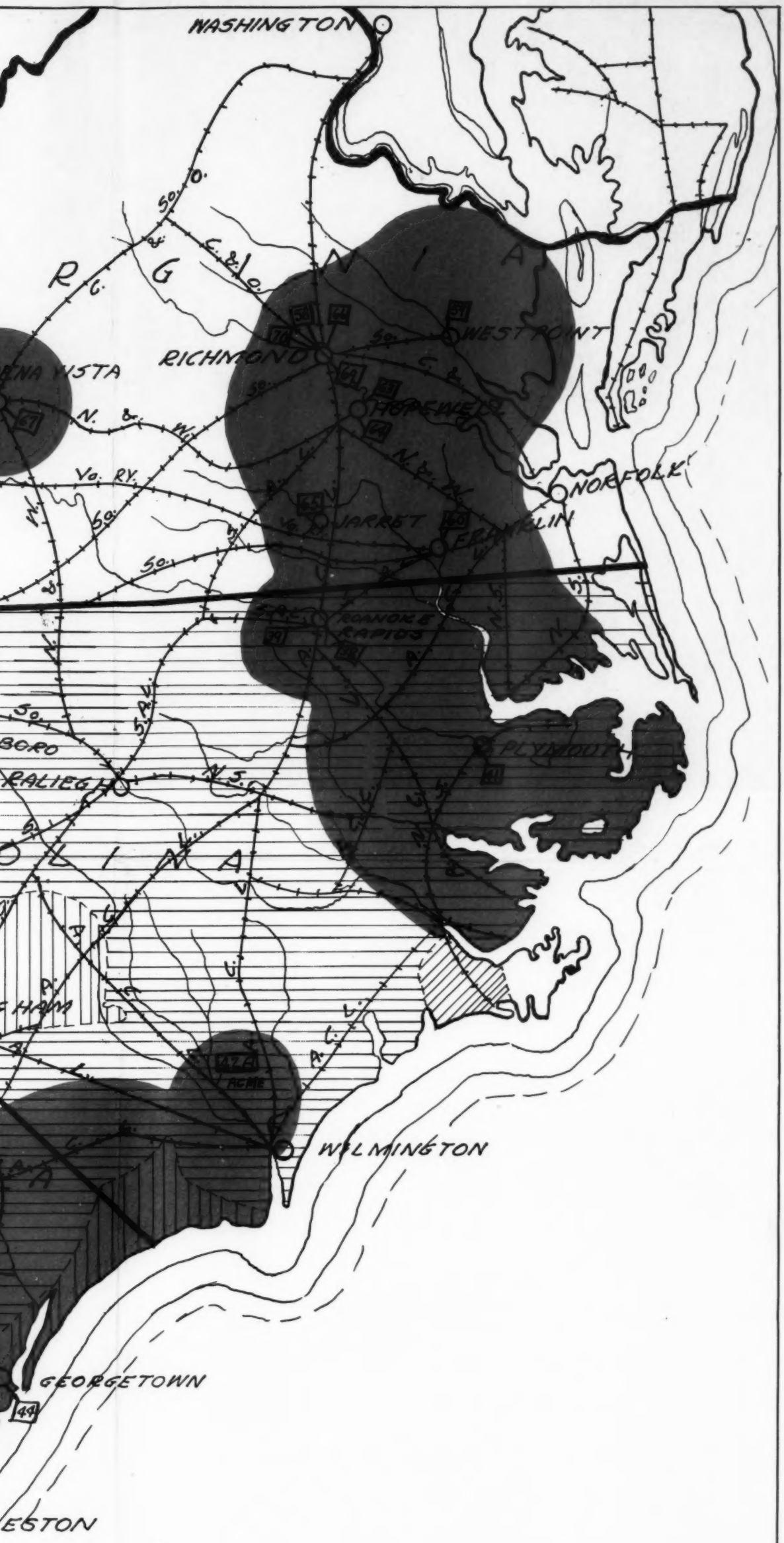
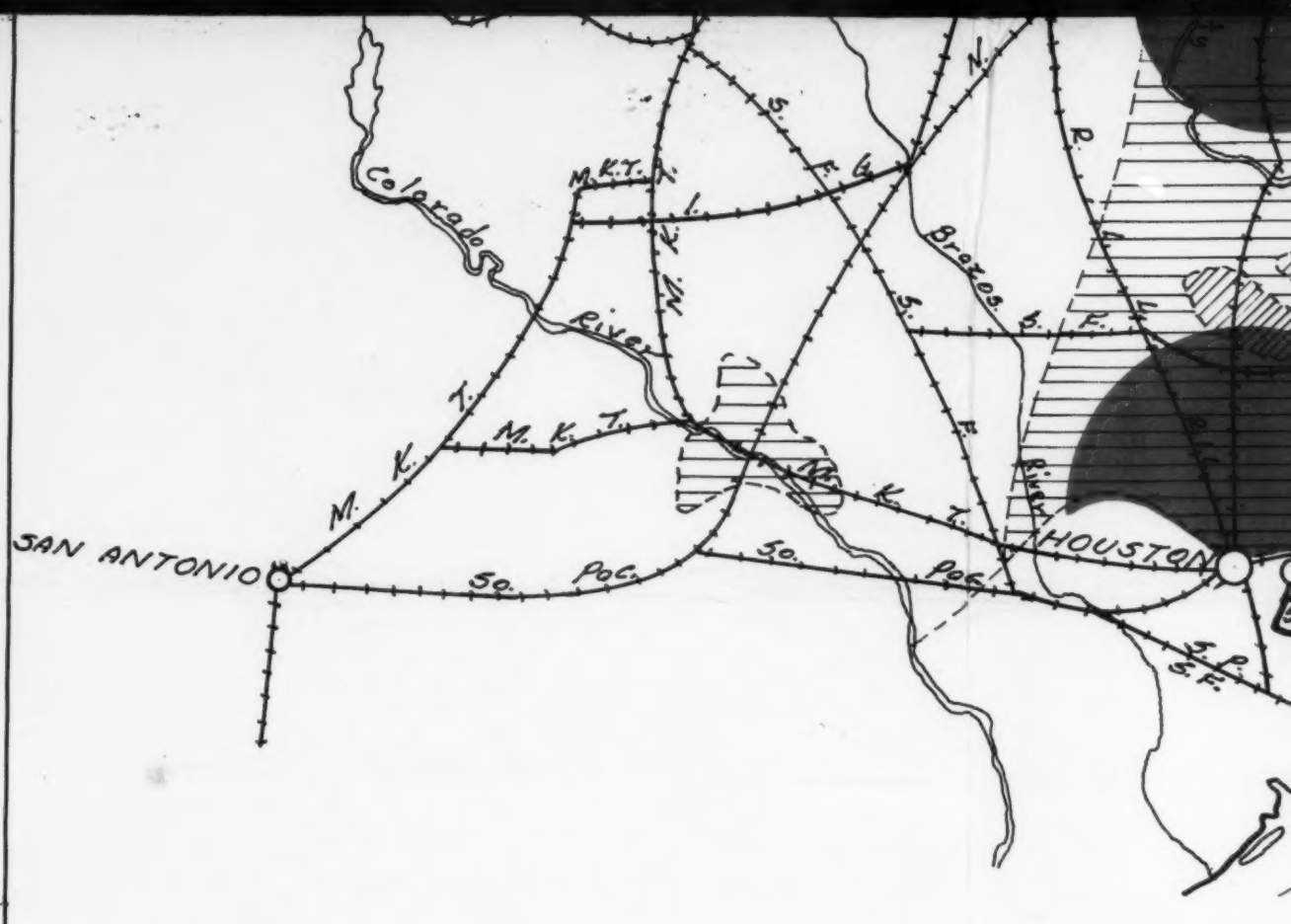


LEGEND

- National forests and purchase units
- Longleaf-slash pine
- Shortleaf-loblolly pine
- 21 — Present pulp mills
- Pulp mill saturation areas, based on theoretical pulpwood requirements of 1/2 cord new annual growth per acre and 20% availability of area
- Mills under construction—1953



Pulp and

Abbreviations: SA—Unblea

State	Map No.	Name of Company	Location	Pulp tons per day	P to
Alabama	1	Gulf States Paper Corp.	Tuscaloosa	350 SA	
	2	Hollingsworth & Whitney Co.	Mobile	420 SA, BSA	
	3	International Paper Co.	Mobile	625 SA, BSA	
	4	Mobile Paper Mill Co.	Crichton	38 GW	
	5	National Gypsum Co.	Mobile	180 GW	
	5A	Coosa River Newsprint Co.	Childersburg	300 GW, 200 BSA	
Arkansas	6	Crossett Paper Mills	Crossett	450 SA, BSA	
	7	International Paper Co., Camden Mill	Cullendale	600 SA	
Florida	8	Armstrong Cork Co.	Pensacola	—	
	9	Container Corp. of America	Fernandina	500 SA	
	10	Rayonier Inc.	Fernandina	340 BSI	
	11, 15B	St. Regis Kraft Center	Pensacola	770 SA, 75 BSA	
	12	International Paper Co.	Panama City	1480 SA	
	13	Miami Paper	Miami	—	
	14	National Container Corp.	Jacksonville	450 SA	
	15	St. Joe Paper Co.	Port St. Joe	400 SA	
	15A	Hudson Pulp & Paper Corp.	Palatka	410 SA	
	15C	Buckeye Cellulose Corp.	Foley	330 BSA	
	15D	St. Regis Paper Co.	Jacksonville	300 SA	
Georgia	16	Brunswick Pulp & Paper Co.	Brunswick	450 BSA	
	17	National Gypsum Co.	Savannah	—	
	18	National Paper Co.	Bolton	—	
	19	Noble Mfg. Co.	Cedartown	—	
	20	St. Marys Kraft Corp.	St. Marys	400 SA	
	21	Union Bag & Paper Corp.	Savannah	1500 SA, 300 SC	
	21A	Southern Paperboard Corp.	Savannah	700 SA	
	21B	Macon Kraft Co.	Macon	650 SA	
	21C	Armstrong Cork Co.	Macon	—	
	21D	National Container Corp.	Clyattville	500 SA	
	21E	Rayonier Inc.	Doctortown	250 BSA	
	21F	Rome Kraft Co.	Rome	650 SA	
Louisiana	22	The Brown Paper Mill Co., Inc.	Monroe	550 SA	
	23	Calcasieu Paper Co., Inc.	Elizabeth	200 SA	
	24	Celotex Corp.	Marrero	650 Bagasse	
	25	Flintkote Co.	New Orleans	—	
	26	Gaylord Container Corp.	Bogalusa	800 SA, 135 SC, 140 BSA	
	27	International Paper Co. Bastrop mill	Bastrop	540 BSA, 60 GW, 460 SC	
	28	International Paper Co. Louisiana mill	Bastrop	—	
	29	International Paper Co.	Springhill	970 SA, 425 BSA	
	30	Southern Advance Bag & Paper Co.	Hodge	325 SA, BSA	

d Paper Production Capacity in the Southern States in 1953

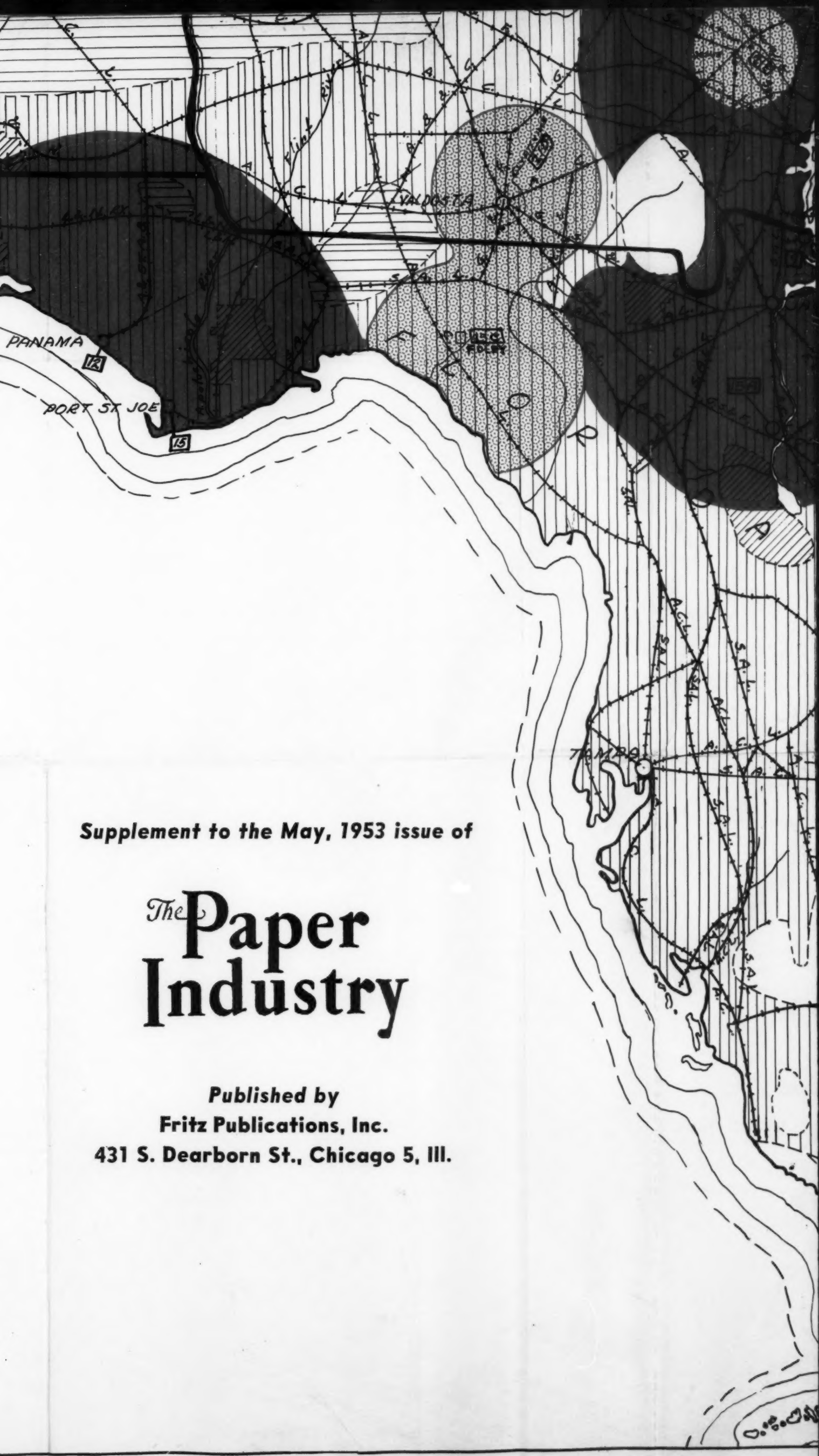
(Including That of Mills Now Under Construction)

bleached Sulfate, SI—Unbleached Sulfite, SO-Soda, SC-Semichemical, GW—Groundwood, B—Bleached, BSA—Bleached Sulfate

Paper tons per day	Products	State	Map No.	Name of Company	Location
350	Kraft Bag and Wrapping	Mississippi	31	Flintkote Co.	Meridian
350	Kraft Wrapping and Bleached Specialties		32	International Paper Co.	Moss Point
550	Kraft Unbleached and Bleached, Wrapping, Bag and Specialties		33	Masonite Corp.	Laurel
125	Wood Pulp Board, Boxboard		34	United States Gypsum Co.	Greenville
175	Wood Fiber Wallboard		34A	International Paper Co.	Natchez
375	Newsprint	North Carolina	35	Carolina Paper Board Corp.	Charlotte
			36	Champion Paper & Fibre Co.	Canton
425	Asphalting, Bag and Wrapping, Butchers, Tag, Board		37	Ecusta Paper Corp.	Pisgah Forest
520	Kraft Wrapping, Bag, Board, etc.		38	Halifax Paper Co., Inc.	Roanoke Rapids
			39	Manchester Board & Paper Co., Inc.	Roanoke Rapids
			40	Mead Corp.	Sylvia
			41	North Carolina Pulp Co.	Plymouth
75	Insulating Board		42	Carolina Paper Mills, Inc.	Rockingham
450	Kraft Pulp and Container Board		42A	Riegel Carolina Corp.	Acme
—	Bleached Sulfite Pulps	South Carolina	43	Sonoco Products Co.	Hartsville
750	Bleached and Unbleached Bag, Wrapping Envelope, Specialties		44	International Paper Co.	Georgetown
1350	Kraft Board		45	West Virginia Pulp & Paper Co.	Charleston
65	Board	Tennessee	46	O. B. Andrews Co.	Chattanooga
425	Kraft Liner, Corrugating Board		47	Buckeye Cotton Oil Co.	Memphis
400	Kraft Board		48	Mead Corp.	Harriman
400	Kraft Bag and Wrapping		49	Mead Corp.	Kingsport
—	Dissolving Pulp (Alpha sulfate and acetate pulp)		50	Mead Corp.	Nashville
300	Sack and Wrapping Paper		51	Southern Chemical Cotton Co.	Chattanooga
			52	Southern Extract Co.	Knoxville
430	Bleached Kraft Pulp		53	Tennessee Paper Mills	Chattanooga
160	Board		53A	Bowaters Southern Paper Corp.	Calhoun
12	Cone and Tube	Texas	54	Champion Paper & Fibre Co.	Pasadena
25	Cores, Tubes, Boxboard		55	Fleming & Sons, Inc.	Dallas
200	Kraft Wrapping		56	Orange Pulp & Paper Mills, Inc.	Orange
1400	Kraft Liner, Wrapping, Bag and Board		57	Southland Paper Mills, Inc.	Lufkin
650	Kraft Liner		57A	East Texas Pulp & Paper Co.	Evadale
650	Kraft Liner	Virginia	58	National Container Corp.	Big Island
165	Insulating Board		59	Chesapeake Corp. of Virginia	West Point
480	Liner Board		60	Camp Manufacturing Co., Inc.	Franklin
—	Bleached Sulfate Pulp, Dissolving Pulp		61	Piedmont Paper Products, Inc.	Buena Vista
55	Kraft Liner		62	Mead Corp.	Bristol
			63	Hercules Powder Co.	Hopewell
550	Kraft Liner, Board		64	Continental Can Co. (Hummel-Ross)	Hopewell
200	Kraft Papers		65	Johns-Manville Products Corp.	Jarratt
1000	Insulating and Building Boards		66	Manchester Board & Paper Co.	Richmond
135	Ragfelt Roofing		67	Mead Corp., Heald Div.	Lynchburg
1260	Kraft Liner, Bag, Wrapping, Chipboard, etc.		68	West Virginia Pulp & Paper Co.	Covington
450	Kraft Papers		69A	Albemarle Paper Mfg. Co. (Hollywood)	Richmond
500	Kraft Papers		69B	Albemarle Paper Mfg. Co. (Browns)	Richmond
			69C	Albermarle Paper Mfg. Co. (Riverside)	Richmond
1270	Letterhead, Index, Kraft Boards		70A	Standard Paper Mfg. Co. (Mill No. 1)	Richmond
315	Kraft Papers		70B	Standard Paper Mfg. Co. (Mill No. 2)	Richmond
			70C	Standard Paper Mfg. Co. (Mill No. 3)	Richmond

d Sulfate

Location	Pulp tons per day	Paper tons per day	Products
Meridian	100 GW	200	Fiber Board and Insulating Mats
Moss Point	590 BSA, 25 SA	550	Kraft Wrapping, Bag, Beached Papers
Laurel	800 SC	800	Masonite Presdwood, Quarter Board, Insulating, etc.
Greenville	240 GW	440	Insulating and Hard Board
Natchez	408 BSA	400	Rayon Dissolving Pulp
Charlotte	—	55	Folding and Set-up Boards
Canton	130 SI, 185 SO, 560 SA	655	Kraft, Book, Band, Envelope, Tablet, etc.
Pisgah Forest	Flax, etc., SC	75	Cigarette Papers
Roanoke Rapids	250 SA	265	Kraft Wrapping
Roanoke Rapids	—	55	Chip and Boxboard
Sylvia	160 SC	170	Chestnut Corrugating Board (9 Point)
Plymouth	800 SA, 200 BSA, 150 SC	675	Paperboard and Specialty Board
Rockingham	260	20	Manifold and Specialty Paper
Acme	225 BSA	—	Bleached Papers
Hartsville	50 SC, 3 GW	450	Chip and Boxboard, Butchers, Corrugating Board
Georgetown	1490 SA, 416 SC	1680	Kraft Board
Charleston	975 SA	905	Kraft Board
Chattanooga	—	85	Chip and Boxboard
Memphis	325 Cotton Linter	180	Cotton Linter Pulp, Sheets and Bales
Harriman	95 SC	95	9 Point Corrugating Board (Chestnut)
Kingsport	160 SC	250	Book, Envelope, Tablet, Coated, etc.
Nashville	65 SC	65	9 Point Corrugating Board (Chestnut)
Chattanooga	175 Cotton Linter	—	Cotton Linter Pulp
Knoxville	82 SC	82	9 point Corrugating Board (Chestnut)
Chattanooga	—	300	Chip and Boxboard
Calhoun	560 GW, BSI	390	Newsprint
Pasadena	450 BSA, 50 GW	410	Machine Coated Paper, Pulp
Dallas	—	250	Chip and Boxboard
Orange	—	60	Wrapping and Bag Kraft
Lufkin	300 GW, 200 BSA	425	Newsprint
Evadale	—	250	Coated Paper
Big Island	150 SC	150	9 point Corrugating Board
West Point	475 SA	400	Kraft Liner, Board
Franklin	330 SA, 50 SC	400	Kraft, Sack, Wrapping, Bag
Buena Vista	20 SO	51	Book, Envelope, Litho, Writing
Bristol	190 BSO	—	Soda Pulp
Hopewell	370 Chem. Cotton	180	Loose Chemical Cotton Pulp
Hopewell	450 SA	400	Kraft Liner, Board, Wrapping
Jarratt	200 GW	400	Building Board
Richmond	—	75	Chip and Boxboard
Lynchburg	360 SC	285	Chestnut Test Liner Board
Covington	430 BSA, 20 SA, 100 BSO, 150 SC	675	Bond, Book, Envelope, Kraft, Litho
Richmond	—	25	Album, Blotting, Insulating, Alpha
Richmond	—	125	Kraft Specialties Colored
Richmond	—	25	Kraft Specialties Colored
Richmond	—	25	Blotting
Richmond	—	—	Coating
Richmond	—	63	Blotting, Book, Cover, Bond, etc.



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BRUNSWICK
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FERNANDINA
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JACKSONVILLE
A.C.L.
S.A.L.
F.E.C.
MIAMI
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PULP
SO

Longleaf-slash pine

Shortleaf-loblolly pine

21 Present pulp mills

Pulp mill saturation areas, based on theoretical pulpwood requirements of 1/2 cord new annual growth per acre and 20% availability of area

Mills under construction—1953

PRODUCTION

1947—20,617 tons of pulp per day

1953—27,768 tons of pulp per day

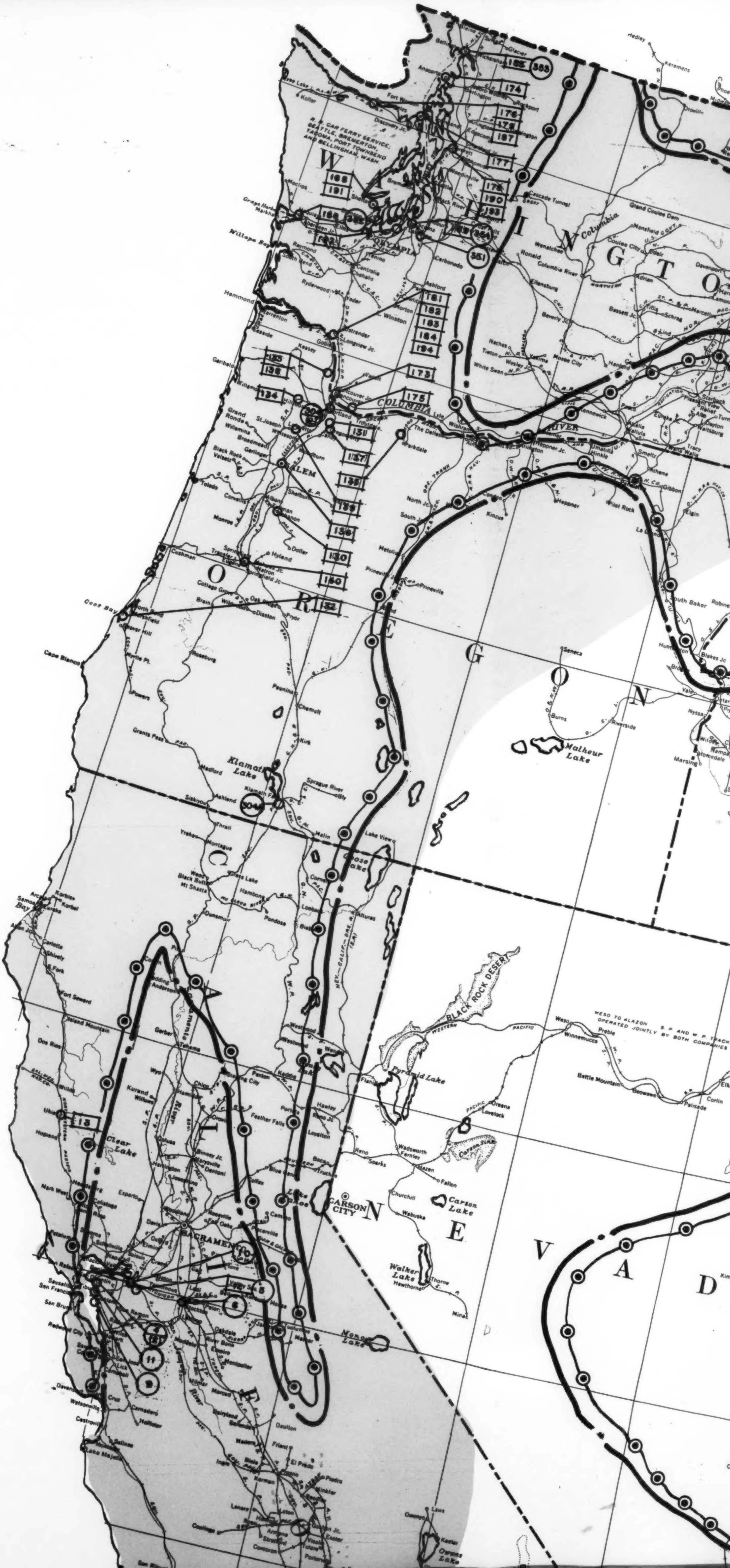
P AND PAPER MAP

OUTHERN STATES

U.S.A.

Map prepared by
J. E. Sirrine Company
Greenville, South Carolina

Revised to Feb. 27, 1953



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OPERATED JOINTLY BY BOTH COMPANIES
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SACRAMENTO
CARSON CITY
COLUMBIA
RIVER
Columbia
Columbia River
Klamath Lake
Malheur Lake
Goose Lake
Clear Lake
Pyramid Lake
Carson Lake
Walker Lake
Mono Lake
Owens Lake
Lake Tahoe
BLACK ROCK DESERT
Carson Sink
Grays Harbor
Willapa Bay
Coos Bay
Samoa Bay
Cape Blanco
Hedley
Keremeos
Glacier
Anacortes
Burlington
Rockport
Discovery Jc.
Koller
Fort Worden
Everett
Woodinville
Cascade Tunnel
Grand Coulee Dam
Mansfield
Coulee City
Odair
Davenport
Wenatchee
Ronald
Ellensburg
Adrian
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Marcellus
Schrag
Beverly Jc.
Naches
Tieton
Yakima
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Hanford
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Pasco
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Wallula
Walla Walla
Tracy
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Umatilla
Hinkle
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Heppner
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Elgin
La Grande
South Baker
Huntington
Blakes Jc
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Midway
Grand Forks
Curlew
Columbia Gardens
Metaline Falls
Northport
Republic
Marcus
Eastport
Curzon Jc.
Kingsgate
Port Hill
Bonners Ferry
Sand Point
Pend Oreille Lake
Troy
Kootenai Falls
Rexford
Whitefish
Columbia Falls
Kalispell
Marion
Somers
Flathead Lake
Polson
Trout Creek
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Dean
Eleanor
Bluestem
Harrington
Lamona
Spokane
Cheney
Rathdrum
Post Falls
Coeur d'Alene
St. Maries
Plummer Jc.
Tekoa
Oakesdale
Garfield
Winona
Colfax
Palouse
Pullman
Moscow
Pomeroy
Turner
Dayton
Lewiston
Spalding
Purdue
Bovill
Elk River
Orofino
Headquarters
Nezperce
32
Stites
Grangeville
Avery
Mullan
Haugan
St. Regis
Paradise
Dixon
Alberton
De Smet
Missoula
Cottonwood
Sunset
Drummond
Garrison
Deer Lodge
Philipsburg
HELENA
Browns
Anaconda
Gregson
Stuart
Silver Bow
Butte
Whitehall
Darby
Joseph
Salmon R
Robinette
New Meadows
Evergreen
McCall
Weiser
Payette
Ontario
Plymouth
Emmett
Caldwell
Nampa
BOISE
Stoddard
Orchard
SNAKE
Hill City
Ketchum
Mackay
Reverse
Glens Ferry
King Hill
Bliss
Richfield
Shoshone
Minidoka
Rupert
Twin Falls
Buhl
Milner
Burley
Declo
Oakley
Rogerson
RIVER
Aberdeen
Moreland Jc.
Blackfoot
Pocatello
McCammon
Idaho Falls
Menan
St Anthony
Ashton
West Yellowstone
Lima
Armstead
Laurin
Alder
Norris
Harrison
Anceney
Manhattan
Logan
Menard
Bozeman
Gallatin Gateway
Wilsall
Livingston
Mission
Lombard
Ringling
White Sulphur Sps.
Harlowton
Red Eagle
Glacier Park
Summit
Blackfoot
Coutts
Sweet Grass
Shelby
Valier
Conrad
Pendroy
Bynum
Agawam
Choteau
Power
Augusta
Vaughn
Black Eagle
Great Falls
Giffen
Armington
NORTHERN
Pacific Jc.
Havre
Lohman
Milk
River
Hogeland
MISSOURI
Winifred
Hilger
Roy
Windham
Moccasin
Lewistown
Grass Range
Winnett
Roundup
Melstone
Slayton
Rapelje
Shepherd
Huntley
Billings
Laurel
Mossmain
Silesia
Fromberg
Bridger
Red Lodge
Bear Creek
Foster Mine
Frannie
Toluca
YELLOWSTONE
Gardiner
YELLOWSTONE NATIONAL PARK
Cody
Jackson Lake
Kirby
Shoshoni
Lander
M O N T A N A
I D A H O
W Y O M
Malad
Preston
Montpelier
Grace
Bear Lake
Cache Jc.
Collinston
Thatcher
Logan
Dathol
Bradford
Brigham
Perry
GREAT SALT LAKE
Rambo
Lakeside
Lucin
Ogden
Gateway
Syracuse
Clearfield
Garfield
SALT LAKE CITY
Wahsatch
Almy Jc.
Evanston
Emory
Leroy
Echo
Grass Cr.
Quealy
Kemmerer
Moyer Jc.
Glencoe Jc.
Blazon Jc.
Granger
Green River
Rock Springs
Winton
Superior
Thayer Jc.
Bitter Creek
Tipton
Rawlins
Ft. Steele
Walcott
Encampment
Saratoga
GREAT SALT LAKE DESERT
Wendover
Shafter
Cobre
Montello
Alazon
Wells
Deeth
Elko
Corlin
Bingham
Welby
Sandy
Warner
Cutler
Lehi
Fairfield
Five Mile Pass
Utah Lake
Provo
Springville
Park City
Heber
Keetley
Strawberry Reservoir
Duchesne
Ouray
Boulter
Tintic Jc.
Eureka
Silver City
Thistle
Soldiers Summit
Nephi
Colton
Kenilworth
Helper
Clear Cr.
Lynndyl
Moroni
Mohrland
Delta
Sevier Lake
Black Rock
Fillmore
Ephraim
Salina
Marysvale
Milford
Sunnyside
Columbia
Mounds
Green River
Green
Grand
Craig
Steamboat Springs
Orestod
Newcastle
Glenwood Sps.
Dotsero
Carbondale
Aspen
Leadville
Minturn
Mack
Grand Jc.
Somerset
Oliver
Crested Butte
Delta
Castleton
Gunnison
Sapinero
Parlin
Montrose
Cedar Creek
Ridgeway Jc.
Ouray
Vance Jc.
Telluride
Silverton
Creede
Nathrop
Kimberley
Ely
McGill
Pioche
Caliente
Islen
Acoma
Lund
Iron Mountain
Cedar City
U T A H
C O L

San Miguel
Corcoran
Owens Lake
Hogeland
Opheim
Whitetail
Scobey
Milk River
Malta
Saco
Glasgow
Wiota
Wolf Point
Fort Peck Dam
RIVER
Bainville
Snowden
Williston
Fairview
Watford City
Sidney
Richey
Grass Range
Winnett
Brockway
Glendive
Beach
Ollie
Melstone
MILWAUKEE
ST. PAUL AND PACIFIC
YELLOWSTONE RIVER
Nichols
Miles City
Colstrip
Billings
Huntley
Toluca
Marmath
C. M. ST. P. & P.
Estevan
Ambrose
Crosby
Portal
Flaxton
Northgate
Sherwood
Antler
Lyleton
Grenora
MINNEAPOLIS
Kenmare
Niobe
Maxbass
Lansford
Stanley
Berthold
Minot
Surrey
Granville
Towner
GREAT NORTHERN
Sanish
Plaza
Prairie Jc.
Max
Drake
Dunseith
Omemee
McCumber
St. John
Hansboro
Armourdale
Hannah
Walhalla
Neche
Pembina
Munich
Rugby
York
Leeds
Churchs Ferry
Devils Lake
Lakota
Esmond
Oberon
Grafton
Larimore
Aneta
McHenry
Portland
NORTH DAKOTA
Turtle Lake
Killdeer
Stanton
Carrington
Wilton
Pingree
Frazier
Rogers
SAULT STE. MARIE
Dickinson
NORTHERN PACIFIC
BISMARCK
Mandan
McKenzie
Jamestown
Sanborn
Valley City
New England
Mott
Cannon Ball Jc.
MISSOURI
Linton
Streeter
Marion
Wishek
La Moure
Independence
Monango
Ashley
Ellendale
Ludden
Cogswell
McIntosh
McLaughlin
Pollock
Madra
Forbes
Leola
Moreau Jc.
Trail City
Isabel
Roscoe
Aberdeen
Groton
Andover
Bristol
Moreau River
Faith
Gettysburg
Faulkton
Northville
Mellette
Orient
Redfield
Doland
Conde
Newell
Belle Fourche
Whitewood
Deadwood
Englewood
Piedmont
Rapid City
Mystic
Hill City
Keystone
SOUTH DAKOTA
PIERRE
Blunt
Huron
Wolsey
Iroquois
Lake Preston
NORTHWESTERN
Kadoka
White River
Chamberlain
Woonsocket
Washington Sprs.
Mitchell
Stickney
Minnekahta
Buffalo Gap
Hot Sps.
Edgemont
Wood
Dallas
Platte
Tripp
Scotland
Tyndall
Springfield
Yankton
Dakota Jc.
Crawford
Niobrara River
C. & N. W.
O'Neill
Norfolk
Dietz
Sheridan
Clearmont
Buffalo
BURL. AND QUINCY
Shoshoni
Hiland
Casper
C. B. & Q.
Douglas
Orin
CHICAGO
Wandover
Walker
Sunrise
Guernsey
NORTH PLATTE
S Torrington
Rawlins
Ft. Steele
Walcott
Medicine Bow
Rock River
Saratoga
Encampment
Centennial
Laramie
Hermosa Jc.
CHEYENNE
Egbert
Kimball
Sidney
Chappell
Alliance
Northport
Bridgeport
NEBRASKA
Oshkosh
UNION PACIFIC
O'Fallons
North Platte
Julesburg
PLATTE
Stapleton
Callaway
Burwell
Sargent
Loup City
St. Paul
Boelus
Palmer
Central City
Grand Island
Gibbon
Kearney
Lexington
Columbus
David City
Stromsburg
Benedict
York
McCool Jc.
Fairmont
Sutton
Clay Center
Geneva
Juniata
Hastings
Minden
Holdrege
Wilcox
Blue Hill
Oxford
Huntley
Orleans
Alma
Red Cloud
Imperial
Culbertson
Sterling
SOUTH PLATTE
Union
Brush
Craig
Steamboat Springs
Coalmont
Buckeye
Wellington
Ft. Collins
Black Hollow
Purcel
Eaton
Greeley
Windsor
Loveland
Wilds
LaSalle
Lyons
Longmont
Boulder
Louisville
Lafayette
Brighton
Golden
Utah Jc.
DENVER
Sullivan
Moffat Tunnel
Orestod
DENVER AND SALT LAKE
Dotsero
Glenwood Sps.
Carbondale
Aspen
Leadville
Minturn
Castle Rock
COLORADO
Limon
Falcon
Shirley
Manitou
Summit
Colorado Springs
Nathrop
Monarch
Salida
Poncha Jc.
Parlin
Gunnison
Texas Cr.
Canon City
Florence
Rockvale
Portland
Pueblo
DENVER TO PUEBLO
A. T. & S. F. AND D. & R. G. W
TRACKS OPERATED JOINTLY
AS A PAIRED TRACK
Ordway
Nepesta
Eads
MISSOURI PACIFIC
Big Bend
May Valley
Lamar
Holly
Las Animas
La Junta
Rocky Ford
Creede
Center
Monte Vista
Hooper
Alamo
Walsenburg
15
St. Francis
Oberlin
Long Island
Norton
Burr Oak
Mankato
Lenora
Stockton
Osborne
Downs
Beloit
Bernard
Colby
Oakley
ROCK ISLAND
UNION PACIFIC
KANSAS
Scott City
Garden City
Jetmore
Larned
Ellinwood
Great Bend
Hoisington
Ellsworth
Kanopolis
Salina
Solomon
Minneapolis
McPherson
Hutchinson
Marquette
A. T. & S. F.
Wolf
TOPEKA

LAKE SUPERIOR
Lake of the Woods
Rainy Lake
Rainy R.
Fort Frances
Pigeon River
Port Arthur
Ft. William
Isle Royal
Red Lake
Warroad
South Jc.
Thief River Falls
St. Hilaire
Plummer
Crookston
Red Lake Falls
Bemidji
Cass Lake
Walker
Wadena
Moorhead
Barnesville
Evansville
Alexandria
Graceville
Morris
Browns Valley
Ortonville
Appleton
Milbank
Clara City
Granite Falls
Hanley Falls
Redwood Falls
Marshall
New Ulm
Sleepy Eye
Mankato
Waterville
St. Clair
Lake Crystal
Madelia
St. James
Butterfield
Windom
Worthington
Fairmont
Blue Earth
Albert Lea
Austin
Chatfield
Spring Valley
Caledonia
Virginia
Tower Jc.
Babbitt
Lenot Junction
Forest Center
Whyte
Two Harbors
Knife River
Grand Rapids
Ashland Jc.
Bessemer Jc.
Watersmeet
Iron River
Iron Mountain
Marquette
Calumet
Ontonagon
Mc Keever
Ishpeming
Champion
Republic
Amasa
Gibbs City
Escanaba
Black River Falls
La Crosse
Sparta
Chippewa Falls
Eau Claire
Stevens Point
Wisconsin Rapids
Green Bay
Madison
Lone Rock
Mineral Pt.
New Glarus
Monroe
Beloit
Janesville
Dubuque
Decorah
Waukon
Cresco
Elkader
Waverly
Cedar Falls
Independence
Waterloo
Cedar Rapids
Marion
Anamosa
Clinton
Sterling
Rock Island
Galesburg
Peoria
Springfield
Decatur
Danville
Champaign
Bloomington
El Paso
Kankakee
Chicago
Aurora
Elgin
Joliet
Des Moines
Marshalltown
Grinnell
Montezuma
Newton
Ottumwa
Albia
Chariton
Centerville
Creston
Red Oak
Council Bluffs
Sioux City
Sioux Falls
Storm Lake
Fort Dodge
Algona
Spencer
Emmetsburg
Le Mars
Cherokee
Rembrandt
Shenandoah
Clarinda
Hamburg
Lincoln
Nebraska City
Falls City
Beatrice
Tecumseh
Hiawatha
Topeka
Lawrence
Leavenworth
Atchison
Kansas City
St. Joseph
Maryville
Grant City
Trenton
Chillicothe
Green City
Kirksville
Milan
Brookfield
Moberly
Mexico
Fulton
Columbia
Jefferson City
Boonville
Sedalia
St. Louis
Alton
Jerseyville
Quincy
Hannibal
Louisiana
Macomb
Keokuk
Burlington
Davenport
Muscatine
Iowa City
Ottawa
Streator
Pontiac
Kewanee
Canton
MINNESOTA
WISCONSIN
MICHIGAN
IOWA
ILLINOIS
MISSOURI
NEBRASKA
KANSAS
MISSISSIPPI RIVER
MISSOURI RIVER
ILLINOIS RIVER
GREEN BAY

PULP AND PAPER M

UNITED STATES

Prepared by the editorial staff of The PAPER INDUSTRY using
a 1951 railroad map supplied by the Army Map Service,
Engineers, U.S. Army, Washington, D.C.

MAP

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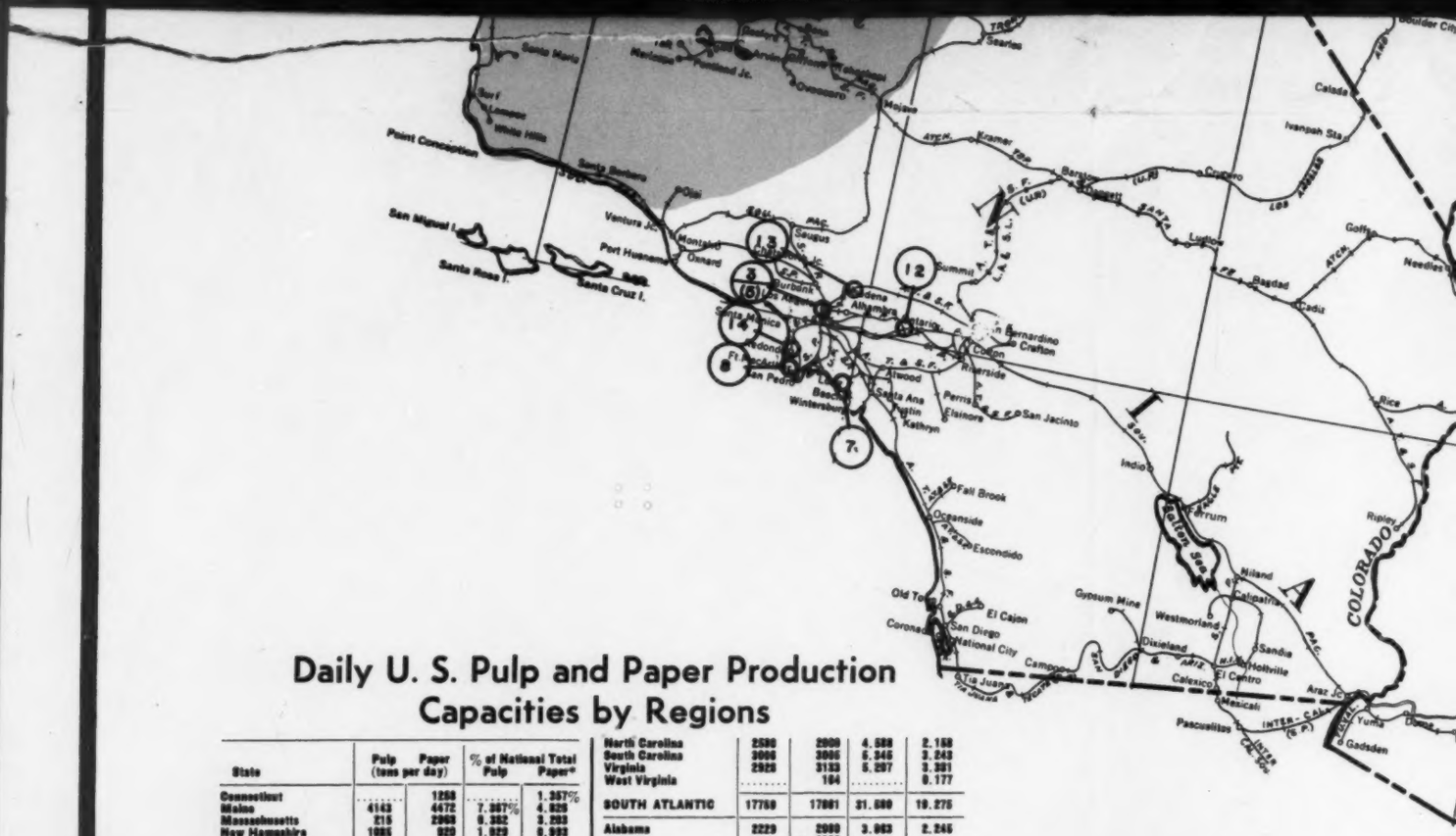


Daily U. S. Pulp and Paper Production Capacities by Regions

State	Pulp (tons per day)	Paper (tons per day)	% of National Total Pulp	% of National Total Paper*
Connecticut	.....	1258	.....	1.357%
Maine	4143	4472	7.367%	4.829
Massachusetts	215	2968	0.382	3.203
New Hampshire	1085	820	1.929	0.883
Rhode Island	.....	100	.....	0.101
Vermont	187	408	0.332	0.441
NEW ENGLAND	5630	10176	10.012	10.982
New Jersey	.....	4542 100M sq. ft.	.....	4.902
New York	2538	7008	5.048	7.049
Pennsylvania	1018	6859	1.811	6.459
MIDDLE ATLANTIC	3556	18889 100M sq. ft.	6.859	19.010
Illinois	75	3368 100M sq. ft.	0.133	3.632
Indiana	.....	1638	.....	1.681
Michigan	838	6706	1.490	7.236
Ohio	323	5449	0.574	5.881
Wisconsin	3743	6849	6.658	9.006
E. NORTH CENTRAL	4979	22708 100M sq. ft.	8.854	24.606
Iowa	50	203	0.106	0.231
Kansas	.....	100	.....	0.104
Minnesota	1430	1763 379MM sq. ft.	2.643	1.902
Missouri	.....	165	.....	0.178
W. NORTH CENTRAL	1480	2368 379MM sq. ft.	2.649	2.564
Delaware	.....	157	.....	0.169
Florida	4946	4150	8.793	4.478
Georgia	4100	4112	7.291	4.437
Maryland	290	1140	0.358	1.231
North Carolina	2536	2908	4.508	2.168
South Carolina	3006	3006	6.345	3.243
Virginia	2925	3133	5.297	3.381
West Virginia	.....	164	.....	0.177
SOUTH ATLANTIC	17759	17881	31.680	19.275
Alabama	2229	2089 2290	3.963	2.245
Mississippi	2413	560M sq. ft.	4.291	2.579
Tennessee	1483	1521	2.682	1.641
E. SOUTH CENTRAL	6105	5981 560M sq. ft.	10.956	6.465
Arkansas	1066	980	1.867	1.057
Louisiana	6255	6762	9.348	6.297
Oklahoma	.....	258	.....	0.269
Texas	1000	1640	1.778	1.769
W. SOUTH CENTRAL	7305	9822	12.990	9.904
Arizona	13	10	0.023	0.011
Colorado	.....	250	.....	0.269
Idaho	220	170	0.388	0.183
New Mexico	.....	15	.....	0.016
MOUNTAIN	213	445	0.379	0.480
California	650	2590 1875	1.150	2.794
Oregon	1896	386M sq. ft.	3.371	1.897
Washington	6351	3548 360M sq. ft.	11.293	3.828
PACIFIC	8897	7963 660M sq. ft.	15.821	8.421
UNITED STATES	56234	92593 5145M sq. ft.	.....	.....

*Does not include the square-foot measures as given in several instances in the paper tonnage column.

Pulp and Integrated Mills and Their P

Abbreviations: SA—Unbleached Sulfate, SI—Unbleached Sulfite, SO—Soda, SC—Semichemi

*Project or expansion under construction. †Planned construction or expansion. Where tonna used in this table are based on figures from the current editions of *Post's Paper Mill Directo*

Map No.	Name of Company	Location	Pulp (tons per day)	Paper (tons per day)	Products
	ALABAMA				
1	Coosa River Newsprint Co.	Coosa Pines	470	300	Pulp: 250 GW, 220 SA; Paper: Newsprint
2	Gulf States Paper Corp.	Tuscaloosa	360	350	Pulp: SA; Paper: Kraft Bag and Wrap.
3	Hollingsworth & Whitney Co.	Mobile	420	330	Pulp: SA, BSA; Paper: Sulfate Spec's.
4	International Paper Co.	Mobile	624	550	Pulp: 152 BSA, 472 SA; Paper: Kraft Bag, Wrap. Conv.
5	Meridian & Tombigbee Paper Mill†	Naheola	150	150	Newsprint, Kraft Pulp & Board
6	National Gypsum Co.	Mobile	180	175	Pulp: GW; Paper: Fiber Wallboard
7	Stone-Mann Paper Co.	Cristina	35	125	Pulp: Pri

Map No.	Name of Company	Location	Pulp (tons per day)	Paper (tons per day)	
	MINNESOTA				
76	Blandin Paper Co.	Grand Rapids	240	150	Pulp Pri
78	Hennepin Paper Co.	Little Falls	35	40	Pulp
77	Minnesota & Ontario Paper Co.	Internat'l Falls	600	220	Pulp Wri
				1,250M sq. ft.	Insul
79	Northwest Paper Co.				

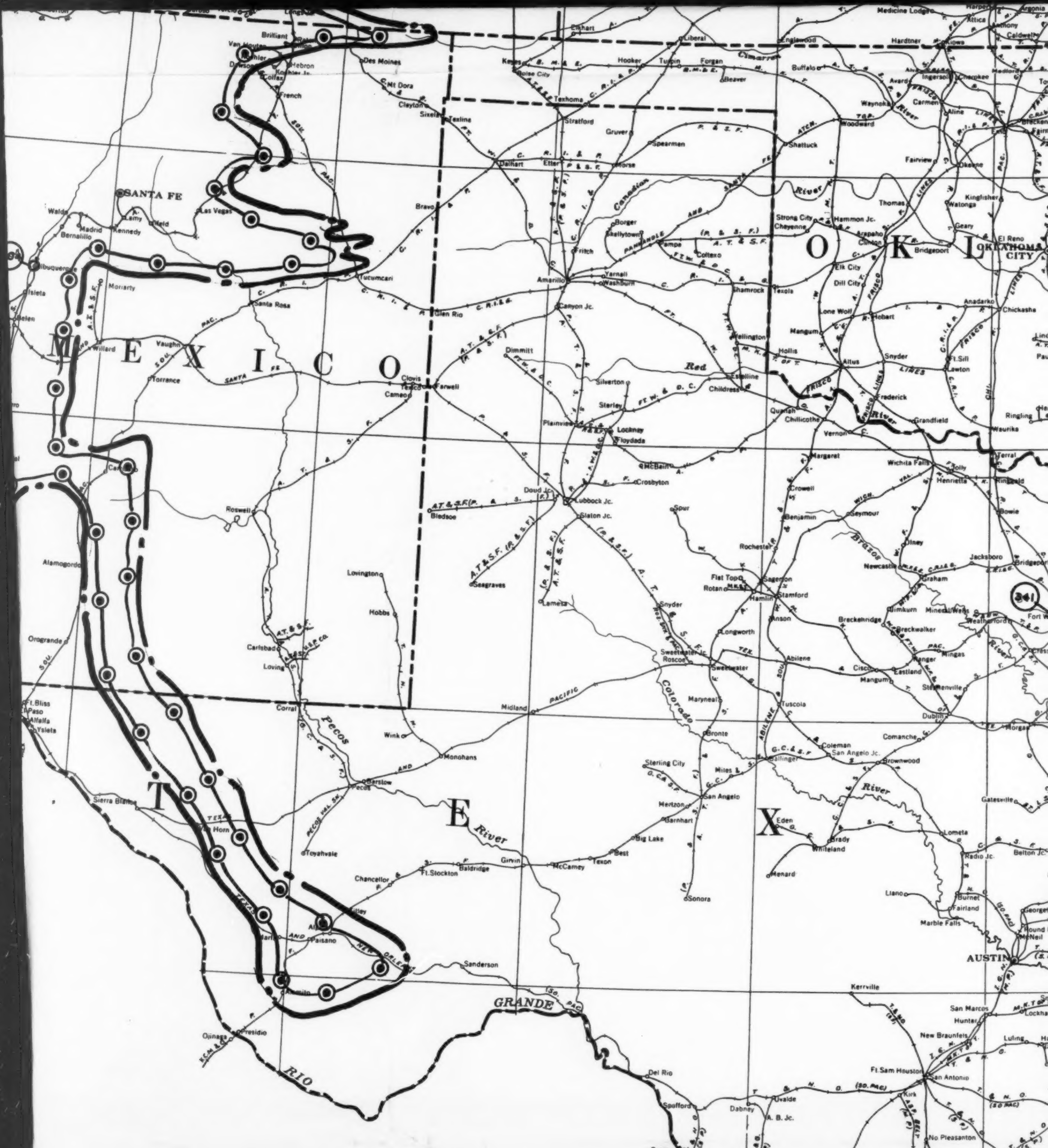
ir Production Capacities

ichemical, GW—Groundwood, B—Bleached, BSA—Bleached Sulfate

tonnages are not given, figures were not available. All tonnages
Directory and *Lockwood's Directory of the Paper and Allied Trades.*

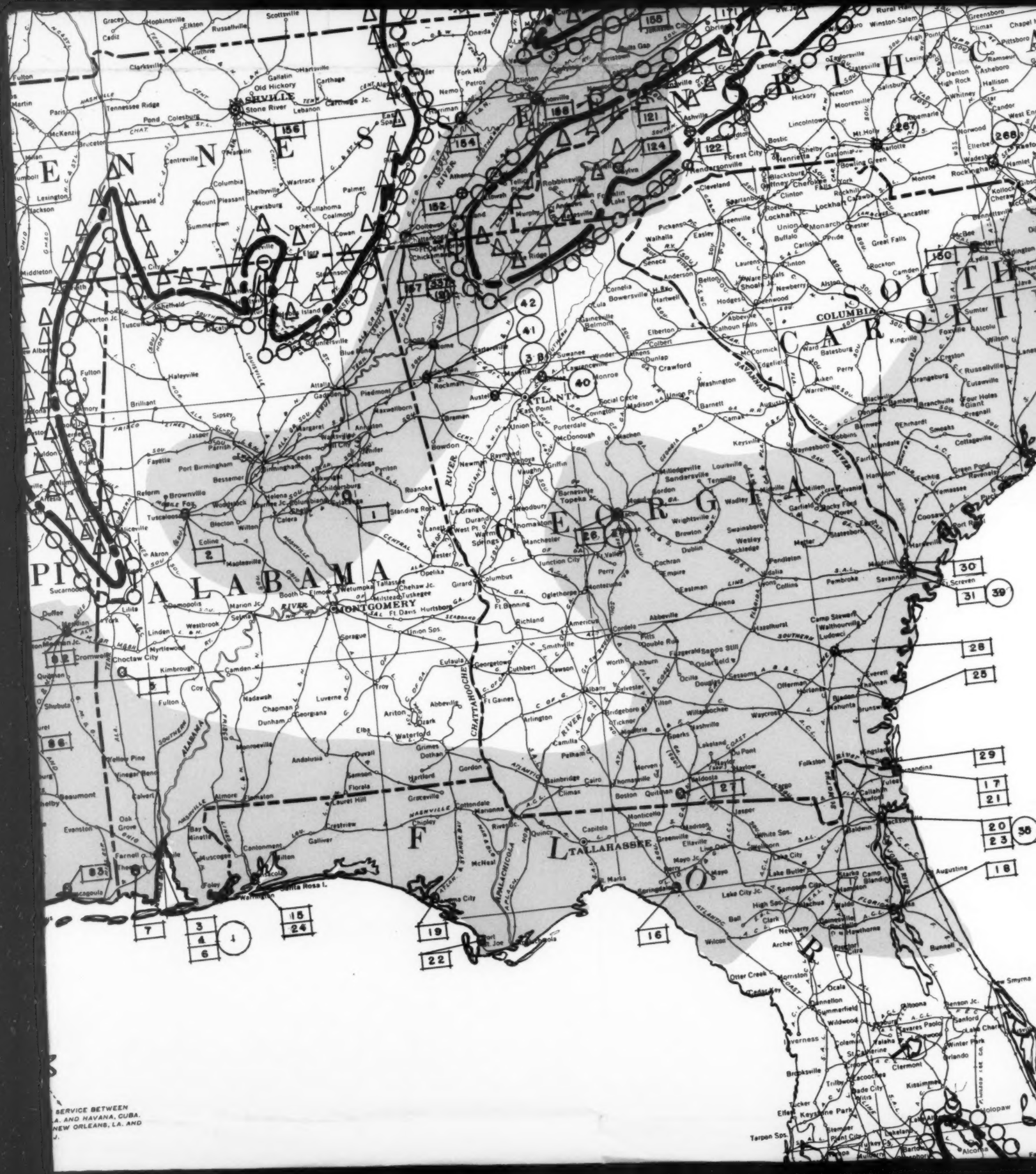
r	Products
50	Pulp: 120 GW, 120 BGW; Paper: Book, Printing
18	Pulp: GW; Paper: Book, Newsprint, Spec's.
29	Pulp: 400 GW, 185 SI, 125 BA; Paper: Book, Writing, Bag, Offset
BM ft.	Insulating Board

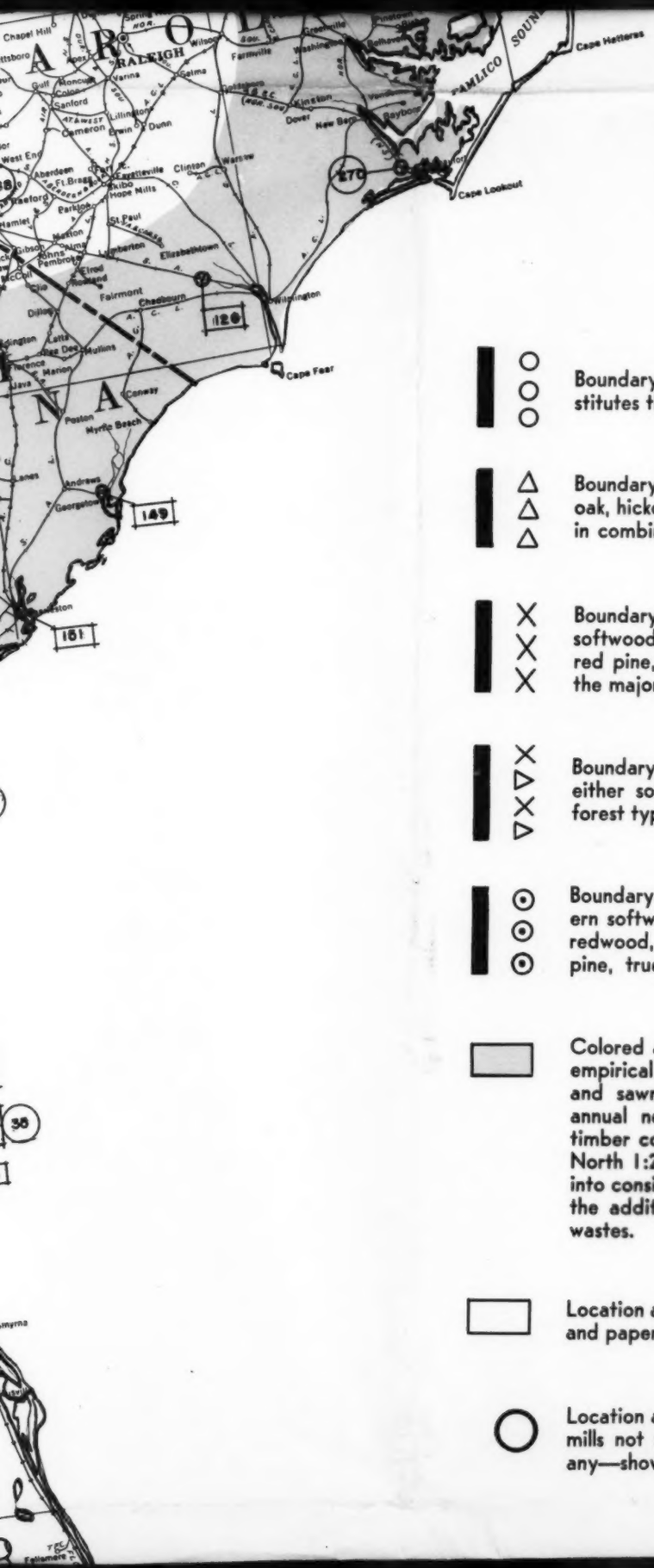
Map No.	Name of Company	Location	Pulp (tons per day)	Paper	Products
147	West Virginia Pulp & Paper Co.	Tyrone	135	145	Pulp: BSA; Paper: Book, Roto
148	West Virginia Pulp & Paper Co.	Williamsburg	85	85	Pulp: BSA; Paper: Book, Spec's.
	SOUTH CAROLINA				
149	International Paper Co.	Georgetown	1900	1850	Pulp: 1490 BA, 410 SC; Paper: Kraft Liner Board, Corr.
150	Sonoco Products Co.				



MEXICO
O K L
T E X
SANTA FE
OKLAHOMA CITY
AUSTIN
Albuquerque
Bernalillo
Madrid
Kennedy
Lamy
Las Vegas
Walde
Isleta
Belen
Moriarty
Willard
Vaughn
Torrance
Santa Rosa
Tucumcari
Glen Rio
Clovis
Texico
Farwell
Cameo
Roswell
Alamogordo
Orogrande
Carlsbad
Loving
Lovington
Hobbs
Brilliant
Van Houten
Dawson
Hebron
Colfax
French
Des Moines
Mt Dora
Clayton
Sixela
Texline
Dalhart
Etter
Stratford
Texhoma
Boise City
Keyes
Hooker
Turpin
Forgan
Beaver
Liberal
Elkhart
Englewood
Buffalo
Medicine Lodge
Hardtner
Woodward
Shattuck
Waynoka
Alva
Avard
Carmen
Aline
Fairview
Okeene
Kingfisher
Watonga
Geary
El Reno
Bridgeport
Thomas
Hammon Jc.
Strong City
Cheyenne
Arapaho
Clinton
Elk City
Dill City
Sayre
Texola
Shamrock
Lone Wolf
Hobart
Anadarko
Chickasha
Mangum
Altus
Snyder
Lawton
Ft. Sill
Hollis
Wellington
Estelline
Childress
Quanah
Chillicothe
Vernon
Frederick
Grandfield
Waurika
Ringling
Terral
Wichita Falls
Henrietta
Bowie
Jacksboro
Bridgeport
Fort Worth
Weatherford
Mineral Wells
Graham
Newcastle
Olney
Seymour
Benjamin
Crowell
Margaret
Spur
Rochester
Stamford
Hamlin
Rotan
Anson
Abilene
Breckenridge
Cisco
Eastland
Ranger
Mingus
Stephenville
Dublin
Comanche
Brownwood
Coleman
Ballinger
Miles
San Angelo
Sterling City
Mertzon
Barnhart
Big Lake
Best
Texon
McCamey
Girvin
Sonora
Eden
Brady
Menard
Lometa
Belton Jc.
Gatesville
Llano
Burnet
Fairland
Marble Falls
Georgetown
Round Rock
McNeil
Kerrville
San Marcos
Hunter
New Braunfels
Lockhart
Luling
Ft.Sam Houston
San Antonio
Kirk
No Pleasanton
Jourdanton Jc.
Jourdanton
Kenedy
Uvalde
A. B. Jc.
Crystal City
Del Rio
Spofford
Dabney
Quemado
Eagle Pass
Porfirio Diaz
Amarillo
Canyon Jc.
Yarnall
Washburn
Fritch
Borger
Skellytown
Pampa
Coltexo
Gruver
Spearman
Bravo
Dimmitt
Silverton
Plainview
Lockney
Floydada
Sterley
Crosbyton
McBain
Lubbock Jc.
Slaton Jc.
Doud Jc.
Bledsoe
Seagraves
Lamesa
Snyder
Longworth
Sweetwater
Roscoe
Maryneal
Tuscola
Bronte
Midland
Wink
Monohans
Barstow
Pecos
Toyahvale
Chancellor
Ft.Stockton
Baldridge
Alpine
Marfa
Paisano
Sanderson
Sierra Blanca
Van Horn
Ft.Bliss
El Paso
Ysleta
Presidio
Ojinaga
Corral
Red River
Brazos River
Colorado River
Pecos River
Canadian
Cimarron River
GRANDE
RIO
PANHANDLE
SANTA FE
PACIFIC
TEXAS
NEW ORLEANS
FRISCO

MISSISSIPPI
R. R. CAR FERRY SERVICE BETWEEN TEXAS CITY, TEX. AND EDGEWATER, N. J.
R. R. CAR FERRY SERVIC
NEW ORLEANS, LA. AND
ALSO BETWEEN NEW O
EDGEWATER, N. J.


TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
ALABAMA
MISSISSIPPI
FLORIDA
NASHVILLE
ATLANTA
MONTGOMERY
TALLAHASSEE
COLUMBIA
CHATTAHOOCHEE RIVER
SERVICE BETWEEN
A. AND HAVANA, CUBA.
NEW ORLEANS, LA. AND
J.



LEGEND:

Boundary enclosing forest area in which Southern pine constitutes the major forest type.

Boundary enclosing forest area in which hardwoods such as oak, hickory, maple, birch, yellow poplar, or gums, singly or in combination, constitute the major forest types.

Boundary enclosing forest area in which north-eastern softwood such as spruce, balsam fir, eastern white pine, red pine, or jackpine, singly or in combination, constitute the major forest types.

Boundary enclosing forest area in the Lake States where either softwood or hardwood may constitute the major forest types.

Boundary enclosing forest area predominately under western softwood types, such as Douglas fir, hemlock, spruce, redwood, ponderosa pine, white pine, larch, lodgepole pine, true fir, Engelmann spruce. Colorado spruce, etc.

Colored areas denote pulpmill saturation areas. These are empirical estimates made on the basis of total pulpmill and sawmill timber requirements as sustained by total annual new forest growth. Current pulpmill to sawmill timber consumption ratios are: for the South 1:2; for the North 1:2; for the West 1:9. No attempt is made to take into consideration losses due to fire, insects, or disease, nor the additional pulpwood supplies in the form of sawmill wastes.

Location and identity by number of pulp or integrated pulp and paper mills.

Location and identity by number of paper and paperboard mills not producing their own pulp. Bottom numbers—if any—show number of mills at that location.

Pulp and Integrated Mills and Their Productio

Abbreviations: SA—Unbleached Sulfate, SI—Unbleached Sulfite, SO—Soda, SC—Semichemical, GW—Grou

*Project or expansion under construction. †Planned construction or expansion. Where tonnages are not gi
used in this table are based on figures from the current editions of *Post's Paper Mill Directory* and *Lockwo*

Map No.	Name of Company	Location	Pulp (tons per day)	Paper (tons per day)	Products
	ALABAMA				
1	Coosa River Newsprint Co.	Coosa Pines	470	300	Pulp: 250 GW, 220 SA; Paper: Newsprint
2	Gulf States Paper Corp.	Tuscaloosa	360	350	Pulp: SA; Paper: Kraft Bag and Wrap.
3	Hollingsworth & Whitney Co.	Mobile	420	350	Pulp: SA, BSA; Paper: Sulfate Spec's.
4	International Paper Co.	Mobile	824	550	Pulp: 152 BSA, 472 SA; Paper: Kraft Bag, Wrap. Conv.
5	Meridian & Tombigbee Paper Mill†	Naheola	150	150	Newsprint, Kraft Pulp & Board
6	National Gypsum Co.	Mobile	180	175	Pulp: GW; Paper: Fiber Wallboard
7	Stone-Mann Paper Co.	Crichton	35	125	Pulp: GW; Paper: Boxboard
	ARIZONA				
8	Arizona Fibre Products, Inc.	Phoenix	13	10	Pulp: SC; Paper: Ins. Board
	ARKANSAS				
9	Crossett Paper Mills	Crossett	450	425	Pulp: SA; Paper: Wrap., Sack, Kraft Spec's.
10	International Paper Co.	Camden	600	520	Pulp: SA; Paper: Kraft Bag, Wrap., Conv.
11	White Star Paper Co.†	Prescott	....	....	Newsprint and Pulp
	CALIFORNIA				
12	Fibreboard Products, Inc.	Antioch	250	250	Pulp: 115 BSA, 135 SC; Paper: Carton Boards, Corr.
13	Masonite Corp.	Ukiah	400	400	Pulp: SC; Paper: Presdwood
	COLORADO				
14	Columbine Pulp & Paper Co.†	New Castle	....	150	Newsprint
	FLORIDA				
15	Armstrong Cork Co.	Pensacola	75	75	Pulp: GW; Paper: Ins. Board
16	Buckeye Cellulose Corp.*	Foley	330	....	Pulp: BSA
17	Container Corp. of America	Fernandina	350	350	Pulp: SA; Paper: Kraft Containerboard
18	Hudson Pulp & Paper Corp.	Palatka	400	400	Pulp: SA; Paper: Kraft Bag and Wrap.
19	International Paper Co.	Panama City	1400	1350	Pulp: SA; Paper: Kraft Board
20	National Container Corp.	Jacksonville	425	400	Pulp: SA; Paper: Kraft Board
21	Rayonier Inc.	Fernandina	340	....	Pulp: BSI
22	St. Joe Paper Co.	Port St. Joe	460	400	Pulp: SA; Paper: Kraft Board
23	St. Regis Paper Co.	Jacksonville	390	300	Pulp: SA; Paper: Bag and Wrap.
24	St. Regis Paper Co.	Pensacola	845	750	Pulp: 770 SA, 75 BSA; Paper: Bleached and Unbleached Bag, Board
	GEORGIA				
25	Brunswick Pulp & Paper Co.	Brunswick	400	....	Pulp: BSA
26	Macon Kraft Co.	Macon	600	600	Pulp: SA; Paper: Kraft
27	National Container Corp.*	Clyattville	500	480	Pulp: SA; Paper: Liner Board
28	Rayonier Inc.*	Jesup	250	....	Pulp: BSA
29	St. Marys Kraft Corp.	St. Marys	400	290	Pulp: SA; Paper: Kraft Wrap. and Conv.
30	Southern Paperboard Corp.	Port Wentworth	600	500	Pulp: SA; Paper: Liner Board, Corr.
31	Union Bag & Paper Corp.	Savannah	1450	1350	Pulp: SA; Paper: Kraft Wrap., Bag and Board
	IDAHO				
32	Potlatch Forests, Inc.	Lewiston	290	170	Pulp: SA, BSA; Paper: Bleached Boards and Papers
	ILLINOIS				
33	Johns-Manville Products Corp.	Waukegan	75	110	Pulp: GW; Paper: Rag Felts and Asbestos Paper
	IOWA				
34	Maizewood Insulation Co.	Dubuque	60	60	Pulp: Wood, Cornstalk, Flax, Hemp and Straw; Paper: Ins. Board
	LOUISIANA				
35	Brown Paper Mill Co.	Monroe	550	550	Pulp: SA; Paper: Kraft Board
36	Calcasieu Paper Co.	Elizabeth	290	290	Pulp: SA; Paper: Kraft Wrap., Conv.
37	Celotex Corp.	Marrero	650	1000	Pulp: Bagasse; Paper: Ins. and Bldg. Boards
38	Gaylord Container Corp.	Bogalusa	1075	1250	Pulp: 600 SA, 135 SC, 140 BSA; Paper: Kraft Bag, Wrap., Liner, Chipboard
39	International Paper Co.	Bastrop	1000	945	Pulp: 400 SC, 540 BSA, 60 GW; Paper: Corr. Board, Kraft Writing, Conv.
40	International Paper Co.	Springhill	1395	1270	Pulp: 970 SA, 425 BSA; Paper: Container, Boxboard, Bag, Conv.
41	Southern Advance Bag & Paper Co.	Hodge	325	312	Pulp: SA; Paper: Kraft Bag
	MAINE				
42	Eastern Corp.	Lincoln	75	75	Pulp: BSI; Paper: Writing
43	Eastern Corp.	South Brewer	125	100	Pulp: BSI; Paper: Writing
44	Great Northern Paper Co.	East Millinocket	290	315	Pulp: GW; Paper: Newsprint
45	Great Northern Paper Co.	Madison	103	100	Pulp: 43 SI, 60 GW; Paper: Spec's.
46	Great Northern Paper Co.	Millinocket	900	900	Pulp: 725 GW, 175 SI; Paper: Newsprint, Mill Wrap
47	Hollingsworth & Whitney Co.	Winslow	250	310	Pulp: SI, BSI; Paper: Spec's.
48	Hudson Pulp & Paper Corp.	Augusta	105	95	Pulp: 20 GW, 35 SI, 50 BSI; Paper: Tissue
49	International Paper Co.	Chisholm	175	364	Pulp: 100 GW, 75 SI; Paper: Book, Hanging, Manila, Mill Wrap.
50	International Paper Co.	Livermore Falls	120	....	Pulp: GW
51	International Paper Co.	Riley	60	....	Pulp: GW
52	Keyes Fibre Co.	Shawmut	70	....	Pulp: GW
53	Oxford Paper Co.	Rumford	530	500	Pulp: 240 BSA, 240 BSI, 50 GW; Paper: Book, Writing, Coated
54	Pejepscot Paper Co.	Brunswick	120	140	Pulp: GW; Paper: Hanging, Drawing, Poster, Newsprint
55	Penobscot Chemical Fibre Co.	Great Works	235	....	Pulp: 120 SO, 115 SI
56	St. Croix Paper Co.	Woodland	335	300	Pulp: 270 GW, 65 SI; Paper: Newsprint
57	St. Regis Paper Co.	Bucksport	340	300	Pulp: 240 SGW, 100 BSI; Paper: Coated Groundwood Book, Spec's.
58	St. Regis Paper Co.	Howland	100	....	Pulp: SA
59	United States Gypsum Co.	Lisbon Falls	....	....	Pulp: GW; Paper: Ins. Board
60	Warren Co., S. D.	Cumberland Mills	220	400	Pulp: SO; Paper: Book, Coated, Spec's.
	MARYLAND				
61	West Virginia Pulp & Paper Co.	Luke	260	290	Pulp: BSA; Paper: Book, Coated, Envelope, Roto, Sanitary
	MASSACHUSETTS				
62	American Pulp & Paper Co.	Holyoke	50	....	Pulp: BSI, SI, BSA, Deinked SGW
63	Cellulose Fibres, Inc.	Holyoke	20	20	Pulp: Cotton; Paper: Cellulose Products
64	Champion-International Co.	Lawrence	55	100	Pulp: SO; Paper: Surface Coated
65	Dooskin Products, Inc.	Mount Tom	70	10	Pulp: SI; Paper: Facial, Toilet, Wadding
66	Wilbraham Paper Co.	North Wilbraham	20	20	Pulp: Cotton; Paper: Kraft Spec's.
	MICHIGAN				
67	American Box Board Co.	Filer City	140	130	Pulp: SC; Paper: Corr.
68	Central Paper Co.	Muskegon	100	100	Pulp: SA; Paper: Tissue Spec's.
69	Detroit Sulphite Pulp & Paper Co.	Detroit	125	125	Pulp: SI, 100 BSI; Paper: Duplex Manifold, M. G., Waxing, Wrap.
70	Escanaba Paper Co.	Gross	150	200	Pulp: GW; Paper: Book, Coated, Spec's.
71	Manistique Pulp & Paper Co.	Manistique	90	85	Pulp: GW; Paper: Hanging, Roto, Conv.
72	Marinette Paper Co.	Menominee	18	....	Pulp: GW
73	Munising Paper Co.	Munising	90	75	Pulp: BSI; Paper: Writing, Spec's.
74	National Container Corp.	Ontonagon	125	125	Pulp: SA; Paper: Kraft Liner
75	Blandin Paper Co.	Grand Rapids	240	150	Pulp: 120 GW, 120 BGW; Printing
76	Hennepin Paper Co.	Little Falls	35	40	Pulp: GW; Paper: Book, New
77	Minnesota & Ontario Paper Co.	Internat'l Falls	600	220	Pulp: 400 GW, 165 SI, 125 SA; Writing, Bag, Offset
78	Northwest Paper Co.	Brainerd	70	1,250M sq. ft. 60	Insulating Board Pulp: GW; Paper: Drawing, Ha
79	Northwest Paper Co.	Cloquet	250	288	Pulp: 90 BSI, 67 BSO, 193 BSA; Coated, Writing, Conv.
80	St. Regis Paper Co.	Sartell	90	110	Pulp: GW; Paper: Book, Roto,
81	Superior Wood Products, Inc.	Duluth	35	....	Pulp: SC
81a	Wood Conversion Co.	Cloquet	40	2,545M sq. ft.	Pulp: SC; Paper: Ins. Boa Products
	MISSISSIPPI				
82	Flintkote Co.	Meridian	100	200	Pulp: GW; Paper: Ins. and Bld
83	International Paper Co.	Moss Point	615	650	Pulp: 500 BSA, 25 SA; Paper Wrap., Waxing, Tissues, Carri
84	International Paper Co.*	Natchez	400	400	Pulp: BSA; Paper: Dissolving P
85	Johns-Manville Products Corp.	Natchez	250	550M sq. ft.	Pulp: 50 SA, 200 GW; Paper:
86	Masonite Corp.	Laurel	800	800	Pulp: SC; Paper: Presdwood
87	United States Gypsum Co.	Greenville	240	440	Pulp: GW; Paper: Ins. and Bld
	NEW HAMPSHIRE				
88	Brown Co.	Berlin	620	350	Pulp: 320 BSI, 300 SA; Pape Impregnating, Gumming, Twi
89	Franconia Paper Corp.	Lincoln	115	115	Pulp: 80 SI, 35 GW; Paper: W
90	Franconia Paper Corp.	Plymouth	22	....	Pulp: GW
91	Groveton Papers Co.	Groveton	325	95	Pulp: 135 SC, 190 SI, 90 BSI; Tissue, Spec's.
	NEW YORK				
92	Adirondack Fibre Corp.	Fort Edward	100	....	Pulp: 50 SA, SO, SI; 50 GW
93	American Wood Board Co.	Schuylerville	24	15	Pulp: GW; Paper: Board Spec's
94	Blandy Paper Co.	Greenwich	12	8	Pulp: GW; Paper: Board Spec's
95	Brownville Board Co.	Brownville	30	50	Pulp: GW; Paper: Board Spec's
96	Crown Zellerbach Corp.	Carthage	20	80	Pulp: GW; Paper: Tissues, To tary
97	Dexter Sulphite Pulp & Paper Co.	Dexter	125	....	Pulp: 100 SI, 25 BSI
98	Diamond Match Co.	Ogdensburg	230	....	Pulp: 100 GW, 130 SI
99	Diamond Match Co.	Plattsburg	40	135	Pulp: GW; Paper: Tissue Spec'
100	Finch, Pruyn & Co.	Glens Falls	290	180	Pulp: GW; Paper: Printing and
101	Fort Miller Pulp & Paper Co.	Fort Miller	15	....	Pulp: GW
102	Gould Paper Co.	Lyons Falls	145	120	Pulp: 100 BGW, 45 BSI; Paper: Spec's.
103	Imperial Paper & Color Corp.	Plattsburg	35	25	Pulp: GW; Paper: Hanging
104	International Paper Co.	North Tonawanda	105	200	Pulp: BSO; Paper: Book, Writi
105	International Paper Co.	Palmer	460	435	Pulp: 295 GW, 135 SI, 120 BSI; Coated, Roto, Hanging
106	International Paper Co.	Ticonderoga	115	113	Pulp: 70 SA, 45 BSA; Paper:
107	Kimberly-Clark Corp.	Niagara Falls	100	273	Pulp: GW; Paper: Book and Cra Spec's.
108	Lewis Co., J. P.	Beaver Falls	30	65	Pulp: GW; Paper: Board Spec's
109	Martin Pulp & Paper Co.	Norwood	20	10	Pulp: GW; Paper: Tissue
110	Meyer & Pratt Inc.	Lyons Falls	18	30	Pulp: GW; Paper: Tissue
111	New York & Pennsylvania Co.	Willsboro	55	....	Pulp: SO
112	Oswego Falls Corp.	Fulton	70	75	Pulp: GW; Paper: Board Spec's
113	Racquette River Paper Co.	Potsdam	80	80	Pulp: 45 SI, 15 GW; Paper: Conv. Spec's.
114	Rogers Co., J. & J.	Au Sable Forks	48	65	Pulp: BSI; Paper: Writing, Cov
115	Rushmore Paper Mills, Inc.	Natural Dam	20	65	Pulp: GW; Paper: Facial and T Napkin
116	St. Lawrence Paper Corp.	Norfolk	140	100	Pulp: 40 SI, 100 GW; Paper: Novel, Roto
117	St. Regis Paper Co.	Deferiet	295	310	Pulp: GW, 175 BGW, 120 SI; Roto, Offset, Tablet
118	St. Regis Paper Co.	Harrisville	43	75	Pulp: GW; Paper: Groundwood
119	Warrensburg Pulp & Paper Corp.	Warrensburg	30	30	Pulp: GW; Paper: Groundw Towelins
120	West Virginia Pulp & Paper Co.	Mechanicville	256	250	Pulp: 66 BSO, 140 BSI, 50 SC; Writing, Roto, Offset
	NORTH CAROLINA				
121	Champion Paper & Fibre Co.	Canton	745	695	Pulp: 185 SO, 580 SA; Paper: W ing, Board Spec's.
122	Ecusta Paper Corp.	Pisgah Forest	75	75	Pulp: Flax, etc. SC; Paper: Cig weight Book, Tank. Spec's.
123	Halifax Paper Co.	Roanoke Rapids	250	255	Pulp: SA; Paper: Kraft Wrap.
124	Mead Corp.	Sylva	160	170	Pulp: SC; Paper: Chestnut Corr.
125	North Carolina Pulp Co.	Plymouth	1150	665	Pulp: 800 SA, 200 BSA, 150 Board and Paper Spec's,
126	Riegel Carolina Corp.	Acme	200	....	Pulp: BSA
	OHIO				
127	Cellulo Co.	Sandusky	3	....	Pulp: Filtering
128	Cheney Pulp & Paper Co.	Franklin	20	....	Pulp: Linen Rag, Jute, Hemp
129	Mead Corp.	Chillicothe	300	610	Pulp: 225 SO, 75 Deinked Stock, Coated, Ledger, Writing,
	OREGON				
130	Crown Zellerbach Corp.	Lebanon	60	60	Pulp: SI; Paper: Wrap., Conv.
131	Crown Zellerbach Corp.	West Linn	525	600	Pulp: 328 GW, 200 SI; Paper: Coated Book, Towseling
132	Coos Bay Pulp Corp.	Empire	72	....	Pulp: SI
133	Fir-Tex Insulating Board Co.	St. Helens	145	145	Pulp: GW; Paper: Ins. Board
134	Forest Fiber Products Co.	Forest Grove	70	70	Pulp: Steamed Wood; Paper: Ha
135	Oregon Lumber Co.	Dee	....	....	Pulp: SC; Paper: Hardboard
136	Oregon Pulp & Paper Co.	Salem	130	115	Pulp: BSI; Paper: Glassine, Writing
137	Publishers' Paper Co.	Oregon City (7)	315	275	Pulp: 215 GW, 100 SI; Paper: Toilet and Wrap. Tissues, Towe
138	St. Helens Pulp & Paper Co.	St. Helens	190	175	Pulp: SA; Paper: Kraft Bag, W ming, Toweling, Envelope
139	Spaulding Pulp & Paper Co.	Newberg	130	....	Pulp: SI
140	Weyerhaeuser Timber Co.	Springfield	250	150	Pulp: SA; Paper: Board
	PENNSYLVANIA				
141	Bare Paper Co., D. M.	Roaring Spring	60	55	Pulp: SO; Paper: Book
142	Glatfelter Co., P. H.	Spring Grove	190	200	Pulp: BSO; Paper: Book, Label, ing, Spec's.
143	Hammermill Paper Co.	Erie	223	350	Pulp: BSI; Paper: Writing, Cov Spec's.
144	International Paper Co.	York Haven	85	85	Pulp: 45 SI, 20 GW; Paper: Spec Toweling, etc.)
145	New York & Pennsylvania Co.	Johnsonburg	280	225	Pulp: 135 SO, 145 BSI; Paper: Tablet, Mimeo.
146	New York & Pennsylvania Co.	Lock Haven	70	463	Pulp: SO; Paper: Book, Offset,

tion Capacities

Groundwood, B—Bleached, BSA—Bleached Sulfate

t given, figures were not available. All tonnages
ckwood's *Directory of the Paper and Allied Trades.*

Map No.	Name of Company	Location	Pulp (tons per day)	Paper (tons per day)	Products
147	West Virginia Pulp & Paper Co.	Tyrone	135	145	Pulp: BSA; Paper: Book, Roto
148	West Virginia Pulp & Paper Co.	Williamsburg	85	85	Pulp: BSA; Paper: Book, Spec's.
	SOUTH CAROLINA				
149	International Paper Co.	Georgetown	1900	1880	Pulp: 1480 SA, 410 SC; Paper: Kraft Liner Board, Corr.
150	Sonoco Products Co.	Hartsville	125	450	Pulp: SC; Paper: Boxboards, Corr.
151	West Virginia Pulp & Paper Co.	Charleston	975	995	Pulp: SA; Paper: Kraft, Container Board
	TENNESSEE				
152	Bowaters Southern Paper Corp.*	Calhoun	660	390	Pulp: GW, BSI; Paper: Newsprint
153	Buckeye Cotton Oil Co.	Memphis	325	....	Pulp: Cotton Linter
154	Mead Corp.	Harriman	95	95	Pulp: SC; Paper: Chestnut Corr. Board
155	Mead Corp.	Kingsport	100	250	Pulp: SC; Paper: Book, Litho., Offset
156	Mead Corp.	Nashville	65	65	Pulp: SC; Paper: Chestnut Corr. Board
157	Southern Chemical Cotton Co.	Chattanooga	175	....	Pulp: Chemical Cotton
158	Southern Extract Co.	Knoxville	83	83	Pulp: SC; Paper: Chestnut Corr. Board
	TEXAS				
159	Champion Paper & Fibre Co.	Pasadena	600	410	Pulp: 450 BSA, 60 GW; Paper: Mach. Coated Paper, Board
159a	East Texas Pulp & Paper Co.*	Evadale	....	250	Pulp: BSA; Paper: Board
160	Southland Paper Mills, Inc.	Lufkin	600	425	Pulp: 300 GW, 200 SA; Paper: Newsprint
	VERMONT				
161	Gilman Paper Co.	Gilman	98	150	Pulp: GW; Paper: Kraft, Newsprint
162	Missisquoi Corp.	Sheldon Springs	90	90	Pulp: GW, BGW; Paper: Board Spec's.
163	Ryegate Paper Co.	East Ryegate	29	50	Pulp: GW; Paper: Bogus Kraft, Groundwood Spec's.
	VIRGINIA				
164	Camp Mfg. Co.	Franklin	330	350	Pulp: 330 SA, 50 SC; Paper: Kraft Sack, Wrap., Spec's., Corr.
165	Chesapeake Corp. of Virginia	West Point	475	400	Pulp: SA; Paper: Kraft Corr., Liner, Spec's.
166	Hercules Powder Co.	Hopewell	300	180	Pulp: Chemical Cotton; Paper: Sheeted Pulp
167	Hummel-Ross Div. (Continental Can Co.)	Hopewell	450	400	Pulp: SA; Paper: Kraft Board, Liner, Sheathing, Spec's.
168	Mead Corp.	Bristol	90	....	Pulp: SC
169	Mead Corp.	Lynchburg	275	230	Pulp: 125 SC, 150 Old Paper; Paper: Chestnut Board, Liner
170	National Container Corp. of Virginia	Big Island	150	150	Pulp: SC; Paper: Corr. Board
171	Schieren Co., Chas. A.	Bristol	9	....	Pulp: SC
171a	Southern Johns-Manville Products Corp.	Jarratt	200	400	Ins. Board
172	West Virginia Pulp & Paper Co.	Covington	600	675	Pulp: 430 BSA, 20 SA, 150 SC; Paper: Book, Roto, Writing, Container Board
	WASHINGTON				
173	Columbia River Paper Mills	Vancouver	110	110	Pulp: SI; Paper: Tissue, Writing, Parchment
174	Coos Bay Pulp Corp.	Anacortes	95	....	Pulp: SI
175	Crown Zellerbach Corp.	Camas	660	700	Pulp: 300 SI, 100 BSI, 400 SA, 60 GW; Paper: Wrap. and Toilet Tissues, Napkin, Toweling
176	Crown Zellerbach Corp.	Port Angeles	430	450	Pulp: 350 GW, 80 SI; Paper: Newsprint
177	Crown Zellerbach Corp.	Port Townsend	490	490	Pulp: SA; Paper: Kraft Board, Wrap., Bag
178	Everett Pulp & Paper Co.	Everett	90	90	Pulp: 70 SC, 20 Deinked Stock; Paper: Book, Offset, Writing
179	Fibreboard Products, Inc.	Port Angeles	95	120	Pulp: 30 GW, 65 SI; Paper: Boxboards
180	Inland Empire Paper Co.	Millwood	110	115	Pulp: 85 GW, 33 SI; Paper: Writing, Manila, Newsprint, etc.
181	Long-Bell Lumber Co.	Longview	55	55	Pulp: Pressed Wood; Paper: Fibreboard
182	Longview Fibre Co.	Longview	573	615	Pulp: 483 SA, 110 GW; Paper: Kraft Board and Paper
183	Lynch Pulp & Timber Co.	Longview	60	....	Pulp: GW
184	Pacific Paperboard Co.*	Longview	75	200	Pulp: GW; Paper: Boards
185	Puget Sound Pulp & Timber Co.	Bellingham	400	40	Pulp: BSI; Paper: Boxboards
186	Rayonier Inc.	Hoquiam	270	....	Pulp: BSI
187	Rayonier Inc.	Port Angeles	300	....	Pulp: BSI
188	Rayonier Inc.	Shelton	230	....	Pulp: BSI
189	St. Regis Paper Co.	Tacoma	320	240	Pulp: SA, BSA; Paper: Multiwall Bag, Board
190	Scott Paper Co.	Everett	600	....	Pulp: BSI
191	Simpson Logging Co.	Shelton	110	300M sq. ft.	Pulp: SC; Paper: Pulp Board
192	West Tacoma Newsprint Co.	Steilacoom	125	160	Pulp: GW; Paper: Newsprint
193	Weyerhaeuser Timber Co.	Everett	525	....	Pulp: 275 BSI, 250 BSA
194	Weyerhaeuser Timber Co.	Longview	450	....	Pulp: 250 BSI, 200 BSA
	WISCONSIN				
195	Badger Paper Mill, Inc.	Peshtigo	75	75	Pulp: BSI; Paper: Writing, Waxed, Spec's.
196	Charmin Paper Mills, Inc.	Green Bay (4)	129	229	Pulp: 100 BSI, 29 GW; Paper: Toilet and Facial Tissues, Napkin, Toweling
197	Charmin Paper Mills, Inc.	Little Rapids	30	....	Pulp: GW, BGW
198	Combined Locks Paper Co.	Combined Locks	50	175	Pulp: GW; Paper: Catalog, Book, Groundwood Spec's.
199	Consolidated Water Power & Paper	Appleton	140	....	Pulp: SI, BSI
200	Consolidated Water Power & Paper	Stevens Point	48	104	Pulp: GW; Paper: Enamel Book
201	Consolidated Water Power & Paper	Wisconsin Rapids (4 Mills)	334	674	Pulp: 139 SI, 195 GW; Paper: Enamel Book, Board, Corr.
202	Cornell Paperboard Products Co.	Cornell	70	188	Pulp: GW; Paper: Wall Board, Board Spec's.
203	Falls Power & Paper Co.	Oconto Falls	155	80	Pulp: 90 SI, 40 BSI, 25 GW; Paper: Tissues, Toweling, Napkins
204	Flambeau Paper Co.	Park Falls	140	95	Pulp: 40 GW, 100 SI; Paper: Writing, Drawing, Spec's.
205	Fort Howard Paper Co.	Green Bay	40	175	Pulp: GW; Paper: Toilet Tissue, Toweling, Napkins, Crepes, Excelsior
206	Green Bay Paper & Pulp Co.	Green Bay	120	120	Pulp: SC; Paper: Corr., Linerboard
207	Jay Pulp & Paper Corp.	Stevens Point	80	....	Pulp: SA
208	Kimberly-Clark Corp.	Kimberly	250	325	Pulp: 120 SI, 130 GW; Paper: Mach. Coated Book
209	Kimberly-Clark Corp.	Niagara	235	290	Pulp: 120 GW, 115 SI; Paper: Book
210	Marathon Corp.	Rothschild	135	210	Pulp: BSI; Paper: Spec. Board & Papers for Food Packaging
211	Marinette Paper Co.	Marinette	42	115	Pulp: SI; Toilet and Facial Tissues, Toweling
212	Mosinee Paper Mills Co.	Mosinee	160	140	Pulp: SA; Paper: Kraft
213	National Container Corp.	Tomahawk	250	250	Pulp: 100 SA, 150 SC; Paper: Kraft Liner, Sambehom. Corr.
214	Nekoosa-Edwards Paper Co.	Nekoosa	200	225	Pulp: SA, BSA; Paper: Food Wrap., Toweling, Bond, Spec's.
215	Nekoosa-Edwards Paper Co.	Port Edwards	115	125	Pulp: BSI; Paper: Fine Writing, Map, Conv.
216	Northern Paper Mills	Green Bay	220	240	Pulp: 80 GW, 140 SI; Paper: Toilet Tissue, Toweling
217	Peavy Paper Mills, Inc.	Ladysmith	18	60	Pulp: GW; Paper: Toilet Tissue, Napkin, Toweling, Newsprint
218	Rhinelander Paper Co.	Rhinelander	110	25	Pulp: SI, BSI; Paper: Glassine
219	Sterling Pulp & Paper Co.	Eau Claire	225	100	Pulp: 65 GW, 80 SI, 80 BSI; Paper: Toilet Tissue, Napkin, Toweling, Fruit Wraps
220	Thilmany Pulp & Paper Co.	Kaukauna	245	200	Pulp: 105 SA, 60 BSA; Paper: Kraft Bag and Spec's.
221	Tomahawk Pulp Co.	Tomahawk	50	....	Pulp: GW
222	Wausau Paper Mills Co.	Brokaw	90	90	Pulp: BSI; Paper: Writing, Offset, Spec's.

Map No.	Name of Company	Location	Tons day	Products
	ALABAMA			
1	Ruberoid Co.	Mobile	80	Roofing Felt
	ARKANSAS			
2	Williams Roofing Co.	Camden	35	Roofing Felt
	CALIFORNIA			
3	Angelus Paperbox Co.	Los Angeles	80	Boxboards
3	Celotex Corp.	Los Angeles	60	Felt, Sheathing
4	Certain-Teed Products Corp.	Richmond	50	Ins. Paper, Roofing, Felts
3	Container Corp. of America	Los Angeles	200	Boxboard, Corr.
5	Fibreboard Products, Inc.	Antioch	300	Boxboards
6	Fibreboard Products, Inc.	Stockton	250	Container, Boxboards
7	Fibreboard Products, Inc.	Sunset	4	Binders Board, Trunk Board
8	Fibreboard Products, Inc.	Vernon	175	Boxboards, Container, Wall Board
3	Flintkote Co.	Los Angeles	285	Roofing, Felts, Sheathing, Boxboard, Plasterboard
9	Flintkote Co.	San Leandro	100	Corr. Board
10	Johns-Manville Products Corp.	Pittsburg	85	Asbestos Roofing, Felts
3	Los Angeles Paper Box & Board Mills	Los Angeles	50	Boxboards
11	Pabco Products, Inc.	Emeryville	150	Floor Covering, Roofing, Felts, Sheathing
12	Potlatch Forests, Inc.	Pomona	80	Wrap. Tissue, Napkin, Toilet
4	Quaker Container Corp.	Richmond	60	Boxboards, Corr.
13	United States Gypsum Co.	South Gate	....	Gypsum Board Liner
14	Velsey Felt Mills, Inc.	Compton	30	Roofing, Felts
	COLORADO			
15	Central Fibre Products Co.	Denver	100	Boxboard
	CONNECTICUT			
16	Burnside Co.	East Hartford	9	Asbestos Gasket, Boxboard
17	Case Bros., Inc.	Burnside	20	Board, Spec's.
18	Case Bros., Inc.	Manchester	15	Board, Spec's.
19	Case & Risley Press Paper Co.	Onsco	5	Cardboard, Pressboard
18	Colonial Board Co.	Manchester	20	Binders Board
20	Dexter & Sons, Inc., C. H.	Windsor Locks	12	Tissues
21	Federal Paper Board Co.	Montville	45	Boxboard, Spec's.
22	Federal Paper Board Co.	Versailles	200	Boxboard, Spec's.
23	Gair Company, Robert	Uncasville	325	Boxboard, Corr.
18	Lydall & Faulds Paper Co.	Manchester	40	Chipboard
24	National Folding Box Co.	New Haven	200	Boxboards
24	New Haven Board & Carton Co.	New Haven	200	Boxboards, Spec's.
25	Norton Co., C. H.	N. Westchester	10	Shoeboard
24	Parker & Son Co., Joseph	New Haven	6	Blotting, Matrix
21	Robertson Paper Box Co.	Montville	60	Boxboards
26	Rogers Corp.	Goodyear	20	Elect. Ins. Board, Spec's.
18	Rogers Corp.	Manchester	8	Molding Compounds
16	Sanitary Paper Mills, Inc.	East Hartford	20	Facial Tissue
27	Seymour Paper Mills, Inc.	Seymour	....	Facial Tissue
28	Sterling Shoe Fibre Co.	Eagleville	6	Shoe Board
29	Stevens Paper Mills, Inc.	Windsor	6	Elect. Ins. Boards, Spec's.
30	Tile Roofing Co.	Stratford	30	Roofing
29	Windsor Locks Paper Corp.	Windsor Locks	9	Tissues
	DELAWARE			
31	Container Corp. of America	Wilmington	50	Corr. Medium
32	Curtis Paper Co.	Newark	20	Rag Book, Spec's.
33	Doeskin Products, Inc.	Rockland	90	Tissues, Toweling, Spec's.
34	Marshall Bros., Inc.	Yorklyn	9	Rag Spec's.
32	National Vulcanized Fibre Co.	Newark	12	Rag Vulcanized Fiber
34	National Vulcanized Fibre Co.	Yorklyn	17	Vulcanized Fiber
	FLORIDA			
35	Miami Paper Board Mills, Inc.	Miami	65	Boxboards, Spec's.
36	Velsey Felt Mills, Inc.	Jacksonville	60	Roofing Felt
	GEORGIA			
37	Armstrong Cork Co.	Macon	105	Ins. Board, Sheathing
38	Austell Box Board Corp.	Austell	70	Boxboards

Map No.	Name of Company	Location	Tons/ day	Products
39	Certain-Teed Products Corp.	Savannah	60	Roofing, Felt, Sheathing
40	National Paper Co.	Bolton	12	Cone and Tube Paper
41	Noble Mfg. Co.	Cedartown	25	Boxboard, Tube Paper
42	Rome Kraft Co.*	Rome	650	Container Board
	ILLINOIS			
43	Alton Box Board Co.	Alton	500	Boxboards, Container, Strawboard, Wallboard
44	Alton Box Board Co.	Carlyle	50	Straw Corr. Board
45	Aurora Paper Board Co.	Aurora	60	Binders Board
46	Barrett Div. (Allied Chem. & Dye Corp.)	Peoria	105	Roofing, Felt
46	Bemis Bros. Bag Co.	Peoria	90	Rope and Kraft Sack Paper
47	Burgess Cellulose Co.	Freeport	...	Stereo Mats, Spec's.
48	Central Fibre Products Co.	Quincy	210	Strawboard, Boxboards, Tube Stock
49	Certain-Teed Products Corp.	East St. Louis	70	Roofing, Felts, Sheathing
50	Certain-Teed Products Corp*	Marseilles	60	Roofing, Felts, Sheathing
51	Container Corp. of America	Chicago (2 Mills)	475	Boxboards
52	Flintkote Co.	Mt. Carmel	70	Roofing Felt
51	Globe Roofing Products, Inc.	Chicago	75	Roofing, Felts
53	Hopper Paper Co.	Taylorville	95	Writing, Offset, Colored Spec's.
54	Lebon Co.	Wilmington	87	Felt and Tissue
51	Masonite Corporation	Chicago	190M sq. ft.	Insulation Board
55	Morris Paper Mills	Morris	100	Boxboards
56	National Biscuit Co.	Marseilles	150	Boxboard
56	Prairie State Paper Mills	Joliet	140	Wrap., Spec's.
57	Quaker Oats Co.	Pekin	75	Boxboards, Tube Stock
58	Rockton Felt & Paper Co.	Rockton	35	Combination Boards
49	Ruberoid Co.	East St. Louis	40	Felts
56	Ruberoid Co.	Joliet	166	Roofing, Felt, Sheathing
51	Standard Asbestos Mfg. Co.	Chicago	15	Asbestos Paper, Felt
51	Volney Felt Mills, Inc.	Chicago	120	Roofing, Felt
59	Western Fibre Co.	Caseyville	10	Shoe Board
	INDIANA			
60	Alton Box Board Co.	Lafayette	125	Boxboards, Strawboard
61	Ball Brothers Co.	Noblesville	90	Strawboard Corr.
62	Beveridge Paper Co.	Indianapolis	60	Bogus Bristol, Board Spec's., Stereo Mats
63	Central Fibre Products Co.	Vincennes	90	Strawboard, Boxboard, Tube Stock
64	Container Corp. of America	Carthage	125	Corr. Medium
65	Container Corp. of America	Wabash	170	Boxboards
66	Fibre Form, Inc.	Columbia City	...	Molded Pulp Products
67	Form Moulding, Inc.	Marion	...	Molded Pulp Products
68	Funke's Sons Co., Ferdinand	Evansville	14	Wrap., Sheathing
69	Gair Co., Robert	Elkhart	230	Boxboards, Spec's.
70	Hartford City Paper Co.	Hartford City	29	Glassine, Manifold
70	International Paper Co. (Idle)	Hartford City	150	Boxboards
71	Keyes Fibre Co.	Hammond	...	Molded Pulp Products
72	Kieffer Paper Mills	Ewing	30	Bogus Board Spec's.
73	Sangamon Paper Mills, Inc.	Eaton	75	Boxboards
74	Superior Newsprint Mills	Gary	60	Newsprint (Deinked Paper)
75	Volney Felt Mills, Inc.	Brookville	60	Roofing, Felt
76	Volney Felt Mills, Inc.	Mishawaka	45	Roofing Felt
77	Weston Paper & Mfg. Co.	Terre Haute (2)	195	Strawboard, Corr., Wrap.
	IOWA			
78	Central Fibre Products Co.	Toma	100	Boxboards
79	Hinde & Dauch Paper Co.	Fort Madison	100	Straw Paper for Corr.
	KANSAS			
80	Central Fibre Products Co.	Hutchinson	150	Boxboards, Straw Corr., Wall Board
81	Lawrence Paper Co.	Lawrence	30	Jute Liners for Corr. Boxes
	LOUISIANA			
82	Bird & Son, Inc.	Shreveport	60	Roofing Felt
83	Flintkote Co.	New Orleans	135	Roofing Felt
	MAINE			
84	Frazer Paper, Ltd.	Madawaska	440	Writing, Lightweight Catalog, Spec's.

Map No.	Name of Company	Location	Tons/ day	Products
85	Gardiner Paper Mills	Gardiner	50	Boxboards, Tube Stock
86	Keyes Fibre Co.	Waterville	...	Molded Pulp Products
87	Rogers Fibre Co.	Buxton	15	Fiber Board
88	Rogers Fibre Co.	East Poland	6	Fiber Board
89	Sherman & Co.	Bolfast	2	Fiber Board
85	Warren Co., S. D.	Gardiner	10	Thin Paper Spec's.
90	Waterfalls Tissue Corp.	Mechanic Falls	...	Facial Tissue
	MARYLAND			
91	Bartgis Brothers Co.	Ichester	150	Boxboard
92	Chesapeake Paper Board Co.	Baltimore	150	Boxboards
93	Congoleum-Nairn, Inc.	Cedarhurst	290	Roofing, Felts, Sheathing
94	Consowinga Paper Mills Corp.	Providence	55	Chipboard, Corr.
95	Elk Paper Mfg. Co.	Childs	135	Corr.
96	Federal Paper Board Co.	Whitehall	35	Boxboards, Spec's.
97	Frostand Paper Co.	Frostand	10	Lining, Imitation Kraft
98	Visner & Sons, Hyman	Woodbine	25	Blotting, Lightweight Boards
	MASSACHUSETTS			
99	Adams Paper Co., A. L.	Baldwinville	25	Crepe Tissues
100	American Tissue Mills	South Hadley	25	Crepe Tissues
101	American Writing Paper Corp.	Holyoke (5)	200	Book, Fine Writing, Cover, Spec's.
102	Atlantic Carton Corp.	New Bedford	90	Boxboards
103	Bancroft Tissue Mills, Inc.	Bancroft	12	Facial and Toilet Tissues
104	Bird & Son, Inc.	East Walpole	300	Boxboard, Container, Building, Pressboard, Spec's.
105	Brightwater Paper Co.	Adams	25	Fine Writing, Absorbent, Filters
105	Brown Paper Co., L. L.	Adams (2)	18	Banknote, Fine Writing
101	Chemical Paper Mfg. Co.	Holyoke	120	Fine Writing, Boxboard, Spec's.
106	Commonwealth Supplies Co.	Amesbury	18	Counter, Trunk Board
107	Crane & Co.	Dalton (4)	22	Fine Writing, Carbon, Banknote
108	Crocker, Burbank & Co.	Fitchburg (7)	375	Book, Offset, Roto, Bristols, Tissue, Industrial Papers
101	Crocker-McElwain Co.	Holyoke	35	Fine Writing
109	Deerfield Glassine Co.	Monroe Bridge	29	Glassine, Laminated, Waxed
110	Dooskin Products, Inc.	Wheelwright	30	Facial Tissue, Napkins
111	Erving Paper Mills	Erving	40	Crepe Tissues, Napkin, Toweling, Shredded
112	Eslocck Manufacturing Co.	Turners Falls	7	Onion Skin Thin Bonds
108	Faluiah Paper Co.	Fitchburg	75	Blanks, Coated Cardboard
108	Fitchburg Paper Co.	Fitchburg (3)	150	Book, Writing, Box Covering, Industrial Spec's.
101	Franklin Paper Co.	Holyoke	29	Boxboards
113	Gair Co., Robert	Haverhill	265	Boxboards
114	Gair Co., Robert	Natick	60	Boxboards
115	Groton Leatherboard Co.	West Groton	...	Matrix Paper
104	Hollingsworth & Vose Co.	East Walpole	60	Rope, Jute, Wood, Rag Spec's.
116	Hollingsworth & Vose Co.	West Groton	25	Rope, Jute, Wood, Rag Spec's.
116	Hurlbut Paper Co.	South Lee	29	Absorbent Spec's., Filter, Photo Base
117	Jenkins Co., George O.	Bridgewater (2)	33	Leather Board, Shoe Board
112	Keith Paper Co.	Turners Falls	25	Fine Writing
118	Mead Corp.	N. Leominster	35	Bristols, Photomount, Blotting, Spec's.
119	Morrimac Paper Co.	Lawrence	60	Cable Ins., Saturating Spec's.
120	Millers Falls Paper Co.	Millers Falls	15	Fine Writing, Blueprint
101	Newton Paper Co.	Holyoke	55	Bogus Bristol, Boxboards
101	Parsons Paper Co.	Holyoke	20	Fine Writing
121	Pramold Corp.	W. Springfield	15	Gasket Papers, Saturating Papers
122	Rising Paper Co.	Housatonic	30	Fine Writing, Spec's.
123	St. Regis Paper Co.	East Pepperell	125	Sulfate Spec's.
124	Schweitzer, Inc., Peter J.	Lee (3)	32	Cigarette, Carton, Technical Tissues
125	Seaman Paper Co.	Otter River	15	Kraft and Sulfite Tissue Spec's.
121	Southworth Co.	W. Springfield	8	Fine Writing, Onion Skin
126	Spaulding Fibre Co.	Townsend Harbor	6	Hooding Fiber
127	Stevens Paper Mills, Inc.	So. Hadley Falls	...	Elect. Ins. Tissue
128	Stevens Paper Mills, Inc.	Westfield (2)	...	Elect. Ins. Tissue
129	Stony Brook Paper Co.	Waltham	35	Boxboard, Colored Spec's.
121	Strathmore Paper Co.	W. Springfield	29	Fine Writing, Book, Blueprint, Special Finish Papers
130	Strathmore Paper Co.	Woronoco (2)	60	Fine Writing, Book, Blueprint, Special Finish Papers
131	Texon, Inc.	Russell	...	Impregnated Fiber Products
127	Texon, Inc.	So. Hadley Falls	...	Impregnated Fiber Products

Paper and Paperboard Mills (Not Producing Wood Pulp) and Their

*Project or expansion under construction. †Planned constructions or expansion. Where tonnages are not given, figur used in this table are based on figures from the current editions of *Post's Paper Mill Directory* and *Lockwood's Direct*

Map No.	Name of Company	Location	Tons/ day	Products
132	Tileston & Hollingsworth Co.	Boston	80	Book, Offset, Fine Writing, Spec's.
132	Union Box Board Co.	Boston	40	Boxboards
101	Valley Paper Co.	Holyoke	15	Fine Writing, Spec's.
133	West Dudley Paper Co.	West Dudley	35	Tag and Colored Spec's.
124	Westfield River Paper Co.	Lee	7	Glassine
131	Westfield River Paper Co.	Russell	10	Glassine
107	Weston Co., Byron	Dalton (2)	25	Fine Writing
101	Whiting & Co.	Holyoke	...	Fine Writing, Blueprint, Spec's.
101	Whiting Paper Co.	Holyoke (2)	...	Fine Writing, Map, Tracing
	MICHIGAN			
134	Allied Paper Mills	Kalamazoo (2)	250	Book, Coating, Specialty Papers
136	American Box Board Co.	Grand Rapids	200	Boxboards, Container, Strawboard, Corr.
136	Consolidated Paper Co.	Monroe (5)	900	Panel Board, Strawboard, Boxboards, Corr, and Solid Fiber Container
137	Constantine Board & Paper Co.	Constantine	50	Boxboards, Tube and Can Stock
138	Dunn Paper Co.	Port Huron	35	Crepe and Waxing Tissues, Machine Coated Papers, M. G. Spec's.
139	Eddy Paper Corp.	Three Rivers	130	Boxboards
140	Eddy Paper Corp.	White Pigeon	200	Boxboards
141	Fletcher Paper Co.	Alpena	42	Bond, Manifold, Spec's.
142	Ford Motor Co.	Dearborn	60	Panel Board
143	French Paper Co.	Niles	45	Offset, Spec's.
134	Hawthorne Paper Co.	Kalamazoo	42	Fine Writing, Rag Book and Cover, Photo-gelatin
134	Kalamazoo Paper Co.	Kalamazoo (3)	290	Book, Offset, Writing, Coated Papers
144	Kalamazoo Veg. Parchment Co.	Parchment (2)	225	Parchment, Waxed, Sulfite Writing, Kraft and Sulfite Wrap.
145	Lee Paper Co.	Vicksburg	75	Fine Writing, Onion Skin, Technical Spec's.
146	Mac Sim Bar Paper Co.	Otsego	300	Boxboards
147	Marathon Corporation	Menominee	240	Bleached Board Spec's., Waxing Tissue
148	Michigan Carton Co.	Battle Creek (2)	400	Boxboards, Machine Coated
149	Michigan Paper Co.	Plainwell	80	Book, Lightweight Papers, Newsprint
136	Monroe Paper Products Co.	Monroe	125	Boxboards, Corr. and Solid Fiber Container, Spec's.
134	National Gypsum Co.	Kalamazoo	130	Special Paper
148	Otsego Falls Paper Mills, Inc.	Otsego	100	Asphalt Treated Boards
150	Paper Corp. of America	Cheboygan	80	Sulfite Writing
151	Peninsular Paper Co.	Ypsilanti	40	Cover, Calendar Mounts, Spec's.
139	Port Huron Sulphite & Paper Co.	Port Huron	62	M. G. Papers, Waxed, Writing, Filter
134	Rex Paper Co.	Kalamazoo	27	Coated and Uncoated Papers, Folding Offset
136	River Raisin Paper Co.	Monroe (4)	500	Boxboard, Strawboard, Corr. and Solid Fiber Container
152	Rochester Paper Co.	Rochester	12	Absorbent, Cover, Photo Mount, Matrix
153	Rockford Paper Mills, Inc.	Rockford	50	Boxboards
139	Rocky River Paper Mills, Inc.	Three Rivers	60	Bogus Bristols, Boxboard, Colored Spec's.
134	St. Regis Paper Co.	Kalamazoo	225	Book, Coated, Offset, Bible, Writing
154	Simplex Paper Corp.	Palmyra	200	Moisture Proof Paper and Board
143	Simplicity Pattern Co.	Niles	15	Pattern Tissue, Spec's.
134	Sutherland Paper Co.	Kalamazoo (3)	600	Boxboards, Spec's.
155	Watervliet Paper Co.	Watervliet	185	Coated, Book, Cover, Tub Sized Offset
	MINNESOTA			
156	Nelson Mfg. Co., B. F.	Minneapolis	150	Bldg. Paper, Container, Boxboards, Felts, Spec's.
157	Waldorf Paper Products Co.	St. Paul	725	Container, Boxboards, Corr., Wall Board
	MISSOURI			
158	Ruberoid Co.	Kansas City	60	Saturating Felt
159	Tamko Asphalt Products, Inc.	Joplin	60	Saturating Felt
158	United States Gypsum Co.	Kansas City	...	Gypsum Board Liner
158	Volney Felt Mills, Inc.	Kansas City	45	Saturating Felt
	NEW HAMPSHIRE			
160	Ashland Paper Mills, Inc.	Ashland	20	Tissue, Toweling
161	Ashuelot Paper Co.	Hinsdale	12	Twisting Tissue
162	Claremont Paper Mill	Claremont	50	Sulfate Spec's.
163	Contoocook Valley Paper Co.	West Henniker	6	Special Papers
162	Coy Paper Co.	Claremont (2)	10	Pattern Tissue
165	Cushman Rankin Co.	Bath	9	Leather Board, Spec's.
164	Fibertex Corp.	Portsmouth	15	Fiber Board
161	Fisk Mill	Hinsdale	4	Tissues
166	Groveton Papers Co.	Northumberland	25	Tissue, Toweling
161	Hinsdale Paper Mfg. Co.	Hinsdale	30	Tissues, Napkin
167	Hoague-Sprague Corp.	West Hopkinton	40	Boxboard, Fiber Board
168	Johns-Manville Corp.	Tilton	...	Asbestos Insulation
170	Milton Leather Board Co.	Milton	12	Shoe and Trunk Board
169	Monadnock Paper Mills, Inc.	Bennington	60	Writing (Rag and Wood), Spec's.
171	Norton & Sons, Inc., F. E.	Hoosiker	6	Fiber and Paper Boards
172	Penacook Fibre Co.	Penacook	6	Shoe and Trunk Board, Spec's.
161	Robertson Co.	Hinsdale (2)	22	Twisting Papers, Tissues
161	Robertson & Co., G. E.	Hinsdale	7	Toilet Tissue
170	Spaulding Fibre Co.	Milton	19	Fiber Board
173	Spaulding Fibre Co.	N. Rochester	8	Transformer, Shoe Board
161	Winchester Paper Co.	Hinsdale	10	Tissue, Toweling
	NEW JERSEY			
174	Allen Paper Mills, Inc.	Bloomfield	8	Tissue, Toweling
175	Barrett Div. (Allied Chem. & Dye Corp.)	Elizabeth	135	Roofing, Felts
176	Boyle Co., John F.	Jersey City	85	Boxboards
174	Budmar Mills & Mfg. Co.	Bloomfield	50	Composition Paper
177	Carey Mfg. Co., The Philip	Perth Amboy	100	Felt Paper
178	Clifton Paper Board Co.	Clifton	400	Boxboards, Spec's.
179	Continental Paper Co.	Ridgefield Park	320	Boxboards, Spec's.
176	Davey Co.	Jersey City	70	Binders, Trunk, Special Boards
180	Fandango Mills	Millburn	20	Binder's Board
181	Federal Paper Board Co.	Bogota	125	Boxboards, Spec's.
182	Flintkote Co.	Little Ferry	100	Roofing, Felts
181	Gair Bogota Corp.	Bogota	110	Container Board
183	Gibraltar Corrugated Paper Co.	North Bergen	100	Corr. Board
184	Hamersley Mfg. Co.	Garfield	...	Parchment, Glassine, Anti-Corrosive Papers
185	Hinde & Dauch Paper Co.	Gloucester (2)	130	Boxboards
186	Homasote Co.	Trenton	180	Ins. Fiber Boards
187	Johns-Manville Corp.	Manville	200	Asbestos Paper and Board
188	Kieckhefer Container Co.	Delair	350	Boxboard, Corr., Liner
179	Lincoln Paper Mills, Inc.	Ridgefield Park	75	Paperboard
189	Lowe Paper Co.	Ridgefield	70	Boxboards
190	MacAndrews & Forbes Co.	Camden (2)	180	Fiberboard, Spec's.,
			1000M sq. ft.	Insulation Board
191	Morris Paper Board Co.	Paterson	70	Boxboards
192	National Gypsum Co.	Garwood	100	Special Paperboard
193	Newark Box Board Co.	Newark	70	Boxboards
194	Pequanoock Valley Paper Co.	Butler	7	Twisting Tissue, Spec's.
195	Personal Products Corp.	Milltown	40	Creped Wadding, Tissues
196	Personal Products Corp.	New Brunswick	12	Wadding
197	Riegel Paper Corp.	Milford	175	Waxed and Laminated Glassine, Manifold Paper
198	Riegel Paper Corp.	Riegelsville (3)	98	Rag and Wood Paper Spec's.
185	Ruberoid Co., The	Gloucester	225	Roofing, Felt, Bldg. Papers
197	Scott Paper Co.	Milford	75	Paper
175	Schweitzer, Inc., Peter J.	Elizabeth	9	Tissue Spec's.
178	Schweitzer, Inc., Peter J.	Jersey City	5	Fine Paper Spec's.
199	Schweitzer, Inc., Peter J.	Spotswood	15	Cigarette
200	Smith Asbestos Products Co.	Millington	100	Asbestos Board
201	Smith & Kanzler Co.	Linden	60	Asbestos Papers, Felt
191	Specialty Paper & Board Mills	Paterson	25	Liner Board
188	Trenton Paper Corp.	Trenton	15	Felts, Bldg. Paper
202	United States Gypsum Co.	Clark Township	...	Roofing Felt, Gypsum Board Liner
179	United States Gypsum Co.	Jersey City	...	Roofing, Saturating Felts
190	West Jersey Paper Mfg. Co.	Camden	10	Saturating Spec's.
203	Whippany Paper Board Co.	Whippany (3)	555	Boxboards, Spec's.
	NEW MEXICO			
204	New Mexico Felt Mills, Inc.	Albuquerque	15	Saturated Felt

Their Production Capacities

...ven, figures were not available. All tonnages
...d's Directory of the Paper and Allied Trades.

Map No.	Name of Company	Location	Tons/day	Products
	NEW YORK			
206	Albia Box and Paper Co.	Troy	43	Boxboards
206	Ancram Paper Mills	Ancram	7	Specialty Tissues
207	Anjopa Paper & Board Mfg. Co.	Napanoch	25	Boxboards, Test Liners
208	A. P. W. Products Co.	Albany	125	Toilet Tissue, Toweling
209	Armstrong Cork Co.	Fulton	250	Felts, Gaskets, Spec's.
210	Atlantic Asbestos Corp.	Red Hook	4	Asbestos Paper
211	Atlas Paper Board Co.	New York	85	Boxboards
212	Bloomer Bros. Co.	Newark	70	Boxboard
213	Bonafide Genesee, Inc.	Rossman	90	Dry Felt
214	Brownville Paper Co.	Brownville	15	Black Pattern, Manifold, Colored Spec's.
215	Burrows Paper Corp.	Little Falls	30	Tissue Spec's.
216	Carthage Paper Makers, Inc.	Carthage	80	Boxboards, Spec's.
217	Certain-Teed Products Corp.	Niagara Falls	50	Roofing, Felts, Bldg. Papers
218	Columbia Box Board Mills, Inc.	Chatham	90	Boxboards
219	Cornwall Paper Mills Co.	Cornwall-on-Hudson	44	Corr. Board
220	Cottrell Paper Co.	Rock City Falls	3	Elec. Ins. Papers
221	Eastman Kodak Co.	Rochester	...	Photo Stock
222	Electric City Paper Mills, Inc.	N. Tonawanda	50	Jute Liners, Tube Stock, Board Spec's.
223	Endicott Johnson Corp.	Johnson City	17	Shoe Board and Felt
224	Everett Paper Mills, Inc.	Marcellus Falls	28	Bag and Toweling, Spec's.
225	Fibre Forming Corp.	Olean	100	Binders Board, Formed Fiber Products
226	Flintkote Co.	Lockport	60	Roofing Felts
221	Flower City Tissue Mills Co.	Rochester	19	Anti-tarnish Tissues, Manifold, Spec's.
227	Fort Orange Paper Co.	Castleton-on-Hudson	100	Boxboard
228	Foster Paper Co.	Utica	75	Wood Pulp Board Spec's.
229	Frost White Paper Mills, Inc.	Salisbury Mills	20	Toilet Tissue, Napkins
230	Gair Co., Robert	Piermont	250	Boxboards
231	Gair Co., Robert	Tonawanda	220	Boxboards
232	Galanto & Sons, Inc.*	Mechanicville	...	
233	Galanto & Sons, Inc.	Walkomsac	112	Kraft Conv. Papers
234	Gotham Paper Mills, Inc.	Battenville	24	Toilet, Napkin, Toweling
235	Grand Bag & Paper Co.	Shortsville	7	Toilet Paper
236	Herkimer Egg Carton Div. (Atlas Tack Co.)	Herkimer	3	Molded Pulp Products
217	International Paper Co.	Niagara Falls	200	Writing, Hanging, Kraft Spec's.
237	Kelly-Forsyth Corp.	Port Leyden	15	Kraft Twisting Tissue
238	Kelly-Forsyth Corp.	Ithaca	12	Kraft Twisting Tissue
239	Knowlton Brothers, Inc.	Watertown	20	Absorbent and Saturating Papers
240	Lanex Fiber Industries, Inc.	Beaver Falls	25	Latex Content Boards and Papers
241	Lawless Bros. Paper Mills, Inc.	East Rochester	125	Container, Boxboards, Corr., Wrap.
242	Little Falls Paper Co.	Newburgh	17	Tissues and Colored Spec's.
243	Manning Paper Co., John A.	Green Island	42	Rope and Rice Papers, Spec's.
206	Manning Paper Co., John A.	Troy	15	Elect. Ins. Pressboard, Engravers Board
244	Marathon Corp.	Oswego	170	Paper and Paperboard
245	Marinette Paper Co.	Fort Edward	137	Toilet Tissue, Toweling, Wax Paper
246	Marinette Paper Co.	Glens Falls	32	Toilet and Wiping Tissue
247	McIntyre Bros. Paper Co.	Fayetteville	15	Anti-tarnish Tissue, Wrap.
248	Modern Tissues Corp.	Amboy	4	Facial Tissue
249	Mohawk Paper Mills, Inc.	Cohoes	40	Fine Writing
215	Mohawk Valley Paper Co.	Little Falls	25	Tissue, Twisting, Spec's.
250	Mohawk Paper Mills, Inc.	Waterford	37	School Papers, Spec's.
228	Mutual Box Board Co.	Utica	100	Boxboard
251	National Cellulose Corp.	Baldwinsville	15	Wadding, Tissues, Toweling
252	National Gypsum Co.	New Windsor	53	Gypsum Liner Paper
53	National Mfg. Corp.	Penn Yan	45	Felts, Bldg. and Special Papers
44	Newton Falls Paper Mill, Inc.	Newton Falls	75	Coated Book, Offset, Hanging
200	North End Paper Co.	Fulton	6	Pattern, Toilet, Twisting, Wrap.
224	Onondaga Paper Co.	Marcellus Falls	15	Lightweight Spec's.
256	Orangeburg Mfg. Co.	Orangeburg	...	Fiber Conduit
260	Oswego River Tissues, Inc.	Phoenix	10	Toilet Tissue, Napkin
258	Phoenix Toilet & Paper Mfg. Co.	Phoenix	9	Sulfite and Kraft Sheets
258	River Valley Tissue Mills, Inc.	Phoenix	6	Wrap., Interleaving Tissue
207	Roodout Paper Mills, Inc.	Napanoch	18	Shoe, Laundry and Wrap. Tissues
216	St. Regis Paper Co.	Carthage	80	Kraft Paper Spec's.
257	St. Regis Paper Co.	Herring	37	Kraft Paper Spec's.
239	St. Regis Paper Co.	Watertown	25	Rope, Jute and Kraft Papers
253	Saratoga Paper Co.	Stillwater	6	Lightweight Spec's.
229	Sitroux, Inc.	Utica	15	Wadding, Facial Tissue
259	Smeallie & Voorhees, Inc.	Amsterdam	50	Chipboard, Wrappers
231	Spaulding Fibre Co., Inc.	Tonawanda	20	Paper for Hard Fiber
260	Stevens & Thompson Paper Co.	Greenwich	43	Toilet Tissue, Toweling, Trays, Plates
261	Superfine Paper Mills Inc.	Clayville	45	Tissues, Wadding, Spec's.
262	Stockport Paper Corp.	Stockport	30	Boxboard Corr., Sheathing, Wrap. Tube Stock
256	Sweet Bros. Paper Mfg. Co.	Phoenix	21	Tissues, Bleached Crepe Spec's.
263	Thomson Paper Mills, Inc.	Thomson	30	Facial Tissue
264	Ulster County Mills, Inc.	Saugerties	20	Tissue, Manifold, Groundwood Papers
225	United Board & Carton Corp.	Lockport	100	Boxboards
263	United Board & Carton Corp.	Thomson	140	Boxboards
265	United States Gypsum Co.	Oakfield	...	Gypsum Board Liner
226	Upson Co.	Lockport	130	Wallboard, Special Boards, Coatings
208	Velvet Tissue Products Co.	Fulton	6	Facial Tissue
209	Victoria Paper Mills Co.	Fulton	45	Facial Tissue, Toilet, Twisting
209	Veinoy Felt Mills, Inc.	Fulton	100	Roofing Felt
266	Weisen, Inc., Sherman	Greenwich	17	Facial Tissue, Wadding
268	Wood Flong Corp.	Hoosick Falls	...	Matrix Papers
	NORTH CAROLINA			
267	Carolina Paper Board Corp.	Charlotte	55	Boxboards
268	Carolina Paper Mills, Inc.	Rockingham	20	Facial Tissue, Toilet, Napkin
269	Manchester Board & Paper Co.	Roanoke Rapids	55	Boxboards
270	Veinoy Felt Mills, Inc.	Morehead	50	Roofing, Felts
	OHIO			
271	American Envelope Co.	West Carrollton	70	Writing, Offset
272	Beckett Paper Co.	Hamilton	85	Writing, Cover, Spec's.
273	Carey Mfg. Co., Philip	Lockland	200	Asbestos Paper, Felts, Board, Ins. Papers
274	Celotex Corp.	Avery	55	Roofing Felt
272	Champion Paper & Fibre Co.	Hamilton	425	Coated and Uncoated Book, Writing, Bag, Wrap., Spec's.
275	Chase Bag Co.	Chagrin Falls	47	Rope and Kraft Papers
276	Chillicothe Paper Co.	Chillicothe	125	Book, Writing
277	Container Corp. of America	Cincinnati	200	Container Liner, Chipboard
278	Container Corp. of America	Circleville	100	Corr. Medium
279	Crystal Tissue Co.	Middletown	40	Lightweight Wrap., Tissues, Waxed, Shredded
280	Dresden Paper Mills Co.	Dresden	40	Corr. Straw Board
277	Excello Paper Products Co.	Cincinnati	110	Boards, Mill Wrapper, Spec's.
281	Fairfield Paper & Container Co.	Baltimore	175	Boxboards, Corr.
282	Federal Paper Board Co.	Steubenville	175	Boxboards, Corr.
273	Fox Paper Co.	Lockland	170	Lightweight Boards, Paper Spec's.
279	Gair Co., Robert	Middletown	80	Boxboards, Spec's.
273	Gardner Board & Carton Co.	Lockland	250	Boxboards, Spec's.
279	Gardner Board & Carton Co.	Middletown (2)	250	Boxboards, Laminated Spec's.
283	General Container Corp.	Coshocton	80	Straw and Lightweight Boards
284	Harding-Jones Paper Co.	South Excello	10	Fine Writing
285	Hindo & Dauch Paper Co.	Sandusky (2)	104	Strawboard
286	Howard Paper Mills, Inc.	Dayton	45	Fine Writing
287	Howard Paper Mills, Inc.	Franklin	50	Writing, Offset
288	Howard Paper Mills, Inc.	Urbana	50	Fine Writing
289	Interstate Folding Box Co.	Miamisburg	80	Boxboards
290	Jaite Co.	Jaite	40	Kraft Bag
291	Leighton Fibre Products Co.	Columbus	7	Shoe Board
287	Logan-Long Co.	Franklin	80	Roofing, Felts
292	Loreco Industries, Inc.	Lancaster	60	Boxboards, Test Liner
293	Massillon Paper Co.	Massillon	30	Chip Board, Spec's.
294	Monroe Falls Paper Co.	Monroe Falls	40	Bogus Corr., Jute
295	Ohio Boxboard Co.	Rittman	500	Container, Boxboards, Corr.
259	Ohio Paper Co.	Miamisburg	75	Roofing, Felts
271	Orford Miami Paper Co.	West Carrollton	135	Book, Writing
296	Phillips Co., Thos.	Akron	14	Paper Flour Sacks
281	Pollock Paper Corp.	Columbus	25	Waxing Papers
287	Procel, Inc.	East Palestine	35	Boxboards, Corr.
298	Queen City Paper Co.	Tipp City	35	Straw and Chip Boards
299	Salt Mountain Co.	Rockdale	70	Asbestos Papers
279	Sarg Paper ...			
283	Stone Conta...			
287	Stone Conta...			
300	Toronto Pap...			
288	United Boar...			
301	United State...			
302	Weston Pap...			
279	Wrenn Paper...			
303	Certain-Tee...			
303	National Gy...			
304	Pacific Resi...			
304	Veiney Felt ...			
304a	Weyerhaeus...			
305	Bisking Pape...			
306	Certain-Tee...			
307	Container C...			
308	Continental-...			
307	Crown Pape...			
308	Daring Pape...			
305	Davey Co.			
309	Dean Mills, ...			
305	Downingtow...			
310	Durham Pap...			
305	Eagle Paper...			
311	Exton-Dikes...			
312	Empire Box ...			
313	Exton Paper...			
314	Federal Pap...			
316	Girard Pape...			
316	Glassine Pa...			
307	Hamilton & ...			
314	Hopper Pape...			
317	Internationa...			
318	Kozsbey & ...			
319	Lansdowne ...			
307	McDowell P...			
320	Modena Pap...			
321	Morgan Pap...			
322	National Pa...			
307	Newman & ...			
323	Norristown ... and Asbesto...			
324	Paper Produ...			
325	Patterson P...			
326	Pennsylvani...			
327	Pittston Pap...			
314	Reading Cor...			
328	Rieser Co., ...			
329	Ruberoid Co...			
306	Schmidt & A...			
311	Schweitzer, ...			
330	Scott Paper ...			
314	Seaboard Pa...			
305	Shyrock Bro...			
331	Tarentum P...			
332	Taylor Fibre...			
333	Union Mills ...			
334	United State...			
335	United State...			
307	Whitehouse ...			

Location and identity by number of pulp or integrated pulp and paper mills.

Location and identity by number of paper and paperboard mills not producing their own pulp. Bottom numbers—if any—show number of mills at that location.

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Name of Company	Location	Tons/day	Products
g Paper Co.	Middletown (3)	234	Absorbent Tissue, Sulfate and Jute Spec's., Fine Writing
e Container Corp.	Coshocton	38	Strawboard
e Container Corp.	Franklin	100	Boxboards, Liner
onte Paper Mfg. Co.	Toronto	95	Boxboard, Tube Stock
ed Board & Carton Corp.	Urbana	100	Boxboards
ed States Gypsum Co.	Gypsum	...	Gypsum Board Liner
ton Paper & Mfg. Co.	St. Mary's	120	Solid Fiber Container Board
an Paper Co.	Middletown	20	Absorbent and Vulcanizing Papers
OKLAHOMA			
tain-Toed Products Corp.	Pryor	100	Paperboard
onal Gypsum Co.	Pryor	150	Paperboard
OREGON			
fic Roofing Co.	Portland	25	Roofing Paper
ey Felt Mills, Inc.	Portland	60	Roofing, Saturating Felt
erhaeuser Timber Co.*	Klamath Falls	300M sq. ft.	Fiber Board
PENNSYLVANIA			
ing Paper Mfg. Co., S. Austin	Downingtown (2)	105	Boxboards, Bldg. Paper, Spec's.
tain-Toed Products Corp.	York	67	Roofing, Felts, Bldg. Papers
tainer Corp. of America	Philadelphia	550	Container, Boxboards
ntinental-Diamond Fibre Co.	Bridgeport	25	Elect. Ins. Papers
n Paper Board Co.	Philadelphia	80	Boxboard
ing Paper Co.	Bridgeport	60	Paperboard, Tube Stock, Jute Liner, Spec's.
ey Co.	Downingtown	35	Binders, Trunk and Pattern Boards, Spec's.
n Mills, Inc.	Lancaster	35	Boxboards
rningtown Paper Co.	Downingtown	275	Boxboards, Laminated
ham Paper Board Co.	Durham	40	Boxboards, Spec's.
e Paper Mill	Downingtown	20	Lightweight Board, Sheathing, Spec's.
n-Dikeman Co.	Mt. Holly Springs	12	Absorbent, Hard Fiber Papers
ibre Box Corp.	Stroudsburg	100	Chipboards, Box and Carton
n Paper Mfg. Co.	Exton	6	Tissue
eral Paper Board Co.	Reading	30	Tube Board, Spec's.
rd Paper Mill, Inc.	Girard	10	Bogus Corr., Chip
sine Paper Co.	W. Conshohocken	15	Glassine, Greaseproof
milton & Sons, Inc., W. C.	Philadelphia	150	Fine Writing, Map Papers
per Paper Co.	Reading	30	Writing, Offset
rnational Felt Corp.	Emmaus	75	Roofing, Felts, Sheathing, Gasket
sbey & Mattison Co.	Ambler	40	Asbestos Paper & Tape
sdowne Paper Mill, Inc.	Lansdowne	20	Kraft Tissue and Toweling
Dowell Paper Mills	Philadelphia (2)	27	Glassine, Greaseproof
lena Paper Mills, Inc.	Modena	40	Writing, Spec's.
rgan Paper Co., Inc.	Lititz	...	Tissue
onal Paper Corp.	Ransom	70	Tissues, Toweling, Waxing
rman & Co.	Philadelphia	60	Boxboards
ristown Magnesia			
& Asbestos Co.	Norristown	100	Asbestos Felt
er Products Mfg. Co.	Swarthmore	30	Cellulose Wadding
erson Parchment Paper Co.	Bristol	87	Parchment, Absorbent, Waxing, Drawing, Card, Wrap.
nsylvania General Paper Corp.	Buck Run	12	Hanging, Spec's., Toweling
ston Paper Corp.	Pittston	12	Waxing Papers
ding Corr. Container Corp.	Reading	100	Corr.
er Co., The	Shamokin	6	Facial Tissues
eroid Co.	Erie	30	Asbestos Felts and Papers
midt & Ault Paper Co.	York	200	Boxboard, Corr., Wrap., Sheathing
weitzer, Inc., Peter J.	Mt. Holly Springs	7	Condenser Paper
t Paper Co.	Chester	585	Toilet Tissue, Toweling
board Paper Co.	Reading	35	Corr.
rook Bros.	Downingtown	15	Binders Board, Trunk, Die-cutting
ontium Products Corp.	Tarentum	100	Jute Liner, Liner Board
ler Fibre Co.	Betzwood	17	Absorbing Rag and Pulp Waterleaf
n Mills Paper Mfg. Co.	New Hope	20	Rope and Kraft Elect. Ins.
ed States Gypsum Co.	Oakmont	...	Kraft Bag Papers
ed States Paper Mills, Inc.	Chambersburg	20	Creped Paper Spec's.
tehouse Paper Co.	Philadelphia	20	Toilet Tissues

Map No.	Name of Company	Location	Tons/day	Products
306	Yorktowne Paper Mills, Inc.	York	80	Container, Boxboards, Corr., Bldg. Papers, Spec's.
	RHODE ISLAND			
336	Bird & Son, Inc.	Phillipsdale	150	Roofing, Felts
	TENNESSEE			
337	Andrews Co., O. B.	Chattanooga	85	Boxboards
338	Kimberly-Clark Corp.	Memphis	150	Wadding
338	Lehon Co.	Memphis	25	Roofing, Felt
337	Tennessee Paper Mills	Chattanooga	295	Boxboards
338	Volney Felt Mills, Inc.	Memphis	45	Roofing, Felt
	TEXAS			
339	Fleming & Sons, Inc.	Dallas	250	Boxboards, Corr., Bldg. Papers
340	Orange Pulp & Paper Mills, Inc.	Orange	60	Kraft Bag and Wrap.
339	Ruberoid Co.	Dallas	65	Roofing Felt
341	Southern Johns-Manville Products Corp.	Fort Worth	50	Roofing Felt
342	Volney Felt Mills, Inc.	Houston	60	Roofing Felt
343	Volney Felt Mills, Inc.	Irving	60	Roofing, Felts
	VERMONT			
344	Adams Paper Co.	Wells River	19	Anti-tarnish Tissue, Spec's.
345	Green Mountain Tissue Co.	Bellows Falls	20	Heavy Wrap., Corr. Papers
345	Hudson Pulp & Paper Corp.	Bellows Falls	45	Gumming Kraft, Toweling
346	Putney Paper Co.	Putney	14	Toilet Tissues, Napkin
347	Vermont Tissue Mills, Inc.	N. Bennington	9	Tissue
345	White Mountain Paper Co.	Bellows Falls	20	Absorbent and Groundwood Spec's,
	VIRGINIA			
348	Albermarle Paper Mfg. Co.	Richmond (2)	145	Kraft Spec's., Blotting
348	Manchester Board & Paper Co.	Richmond	75	Boxboards, Mill Wrappers
349	Piedmont Paper Products, Inc.	Buena Vista	40	Kraft Spec's.
348	Standard Paper Mfg. Co.	Richmond (2)	80	Blotting, Book, Writing, Offset
	WASHINGTON			
351	Fibreboard Products, Inc.	Sumner	75	Boxboards, Jute Liner
352	Grays Harbor Pulp & Paper Co.	Hoquiam	100	Writing, Offset
353	Pacific Coast Paper Mills	Bellingham	67	Toilet Tissue
354	Container Corp. of America	Tacoma	51	Boxboard, Jute Liner
	WEST VIRGINIA			
355	George Co., S.	Wellsburg	15	Rope Paper
356	Hallstown Paper Board Co.	Hallstown	105	Boxboards
355	Hammond Bag & Paper Co.	Wellsburg	40	Boxboard, Corr., Bag Paper
355	Pittsburg Mills, Inc.	Wellsburg	9	Rope Paper
	WISCONSIN			
357	Beloit Box Board Co.	Beloit	30	Boxboard, Bldg. Paper, Tube and Can
358	Bergstrom Paper Co.	Neenah	100	Book, Catalog
359	Cornell Paper Board Products Co.	Milwaukee	250	Boxboard
360	Consolidated Water Power & Paper	Stevens Point	65	Tissue Wrap., Spec's.
361	Fox River Paper Corp.	Appleton (3)	80	Writing and Technical Papers
362	Gilbert Paper Co.	Menasha	42	Blueprint, Writing
358	Kimberly-Clark Corp.	Neenah (3)	229	Creped Wadding Spec's.
363	Line Material Co.	Barton	20	Fiber Conduit
364	Marathon Corp.	Ashland	37	Crepe Tissues, Napkin
362	Marathon Corp.	Menasha	35	Waxing Papers
358	Neenah Paper Co.	Neenah	35	Fine Writings, Map, Onion Skin
365	Nicolet Paper Corp.	West De Pere	30	Glassine
361	Riverside Paper Corp.	Appleton	60	Writing, Sulfite Spec's.
366	Shawano Paper Mills	Shawano	85	Tissues, Napkin, Lightweight Writing
362	Strange Paper Co., John	Menasha	200	Chipboard, Wrap., Liner, Spec's.
365	U. S. Paper Mills Corp.	West De Pere	30	Core Board, Chip, Rag Paper
367	Ward Paper Co.	Merrill	40	Manifold, Writing, Lightweight Spec's.
362	Whiting Paper Co., George A.	Menasha	12	Fine Writing, Spec's.
360	Whiting-Plover Paper Co.	Stevens Point	25	Fine Writing, Thin Papers
362	Wisconsin Tissue Mills	Menasha	20	Napkin, Table Covers